PUBLIC ABATTOIRS AND CATTLE MARKETS

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AND

CATTLE MARKETS.

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PUBLIC ABATTOIRS

AND

CATTLE MARKETS.

FROM THE GERMAN OF

OSCAR SCHWARZ, M.D.,

Director of the Public Slaughterhouse and Cattle Yards, Stolp.

21/-

EDITED BY

G. T. HARRAP,

A.M.I.C.E., M.I.M.E., etc.,

AND

LOUDON M. DOUGLAS,

A.M.I.M.E., M S.A.

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PREFACE BY THE EDITORS.

The attention which is being directed at the present time to the subject of Public Abattoirs is sufficient reason for the publication of this work.

Nowhere in the world has the subject of Abattoirs received more attention than in Germany, and this book contains all that is known on the subject in that country.

As there is no literature of a similar character in English there is little doubt but that this treatise will prove of great value to the various public bodies, and others, who are interesting themselves in this important question.

The difficulties of translation have been met as far as possible by obtaining the assistance of experts in various matters; but it will doubtless be evident that the language in some instances is still open to improvement.

To give a greater interest to this publication some appendices have been added which provide valuable information not given in the original.

PREFACE TO THE FIRST GERMAN EDITION.

The great interest which has been manifested by the public during the last ten years in the erection of public slaughterhouses must have led to the expectation that the gaps in the literature on this subject, which has now become a specialty, would gradually be filled up as the need arose. We only possess a small number of treatises and pamphlets indirectly bearing on the subject, which emanate from architectural specialists who have busied themselves exclusively with the laying out of the buildings. The principal of this very limited series of small *brochures* are "Advice on the Erection of Public Slaughterhouses" and "Mascher on the Methods and Management of Slaughterhouses." On the other hand, most of the works on butcher-meat contain lengthy chapters on this subject, as Gerloch "On the Meat Diet of Mankind"; Schmidt-Mülheim, "Handbook on Butcher-meat"; Schneidemühl, "Butcher-meat in Germany," etc., and especially Ostertag's "Handbook on Butcher-meat," which has recently appeared. Finally, we find in periodicals a multitude of paragraphs and short articles, particularly in such journals as the German *Quarterly* on public health, the magazine of *Hygiene of Meat and Milk*, the Berlin *Veterinary Weekly*, in Schmidt-Mülheim's *Record*, and in the *Record for Farriery*, etc.

The purpose of this book is to gather together all these fragmentary notices in an orderly fashion, and also to give particulars of the laying out of the buildings, with special reference to their sanitary arrangements.

The following division of the subject has been adopted. In Chapters I. to IX. will be found a description of the building and arrangement of a slaughterhouse, with all its appendages, preceded by a short historical introduction dealing with the ancient and modern law with reference thereto. The next chapters, X. to XIII., refer to the management of such buildings, and treat of the staff, police requirements, treatment of meat of a doubtful character, and, in conclusion, the insurance of the animals.

In this way the author intended to write a book which, as well as giving information to the sanitary official, is mainly designed to assist the local or municipal authorities in the planning of slaughter-houses.

This effort was greatly assisted by the help of a number of gentlemen, experts and colleagues, who assisted me in the most willing manner, and to whom I tender my warmest thanks. I am especially indebted to Mr. Director Goltz of Halle, and Mr. Volkie, of Elbing, who have manifested a most lively interest in my work, and have with untiring energy aided me with advice and practical assistance.

Oscar Schwarz.

Stolp, Pomerania, March, 1894.

PREFACE TO THE SECOND GERMAN EDITION.

That some such work as this book was required is unquestionable, seeing that, in spite of the limited circle it is likely to interest, a second edition is necessary within a few years. In the literature on this special subject there was a gap which this work was destined to fill.

Many of the readers of the first edition proffered their assistance, and freely gave the results of their practical experience and knowledge for the second edition. With the abundance of material thus offered to choose from, the several chapters have been enlarged and perfected without altering the arrangement, and the whole may now be considered a complete handbook.

The following chapters especially have been so altered as to require mentioning:

In Chapter I. the slaughterhouse arrangements of European and other countries have been described.

In Chapter II. there are numerous explanations of the laws regarding the management of slaughterhouses.

In Chapter VI. not only are all new structure and apparatus explained by word and illustration, but there are also added various plans of buildings already in operation. As an appendix to this chapter, there are described in passing the appliances for rendering animals unconscious previous to slaughter, also the Jewish and other methods of slaughter.

The chapter on cattleyards is entirely new, and treated throughout most thoroughly.

Notice has been taken of all information that came up to the 1st of August, 1898.

The author hopes that not only will the public authorities find the following pages of service, but that the leading officials may be able to improve the existing abattoirs and yards from the information given; and that they will find this book useful on many questions that arise in connection with this subject.

Oscar Schwarz.

Stolp, Pomerania, August, 1898.

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Illustrations have been borrowed from the following works and newspapers:

1. "Report of the Commission for the Study of the Arrangement of Slaughterhouses for Pigs in Foreign Countries." Vienna, 1896.
2. *The Journal of the Joint Ice Industries.*
3. Ostertag, "Handbook on Meat Inspection." 2nd edition. Stuttgart, 1895.
4. "Behrend Ice and Cold Generating Machines." 3rd edition. Halle, 1894.
5. Lorenz, "Newer Ice Machines." Munich, 1896.
6. Prospectuses and catalogues of various firms.
7. *Ice and Cold Storage.*

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CHAPTER I.

INTRODUCTION.

HISTORICAL SURVEY OF THE SLAUGHTERING-PLACES OF THE ANCIENTS AND OF THE PEOPLE OF THE MIDDLE AGES.

Care for the preservation of health caused the people of the earliest ages to make laws so as to control the use of articles of diet, and particularly of meat. Whether punishment fell on those who broke the laws which regulated the special places for slaughtering, is not easily discoverable, because of the scanty information to be obtained.

The Israelites were commanded to kill for the purpose of sacrifice, always in the outer court of the Temple. For secular purposes there was no command, but, during their wanderings in the wilderness they were always instructed to kill in the outer court of the tabernacle.

In Egypt again they appeared to have killed the necessary animals in the neighbourhood of the court.

We know that the Romans, until the year 300, killed in the Forum in the open air directly under the eyes of the gods, believing that the death of an animal atoned for a sin, and that by making an offering in the open air the gods were appeased. Later, the religious nature of the act was pushed into the background, and the killing was done in the "macellum." These macellæ, or market-places, which stood in the Forum, and the finest and best known of which was the macellum of Livy, contained lanienæ, which, in the opinion of many scholars, served as rooms for the slaughter of cattle. In Pompeii there was situated a macellum, the Pantheon or Augustinum, which, according to the researches of Nissen,* contained undoubted slaughtering chambers, an opinion which is agreed to by Mann.†

* Nissen, "Pompeian Studies on the State of Towns in Ancient Times" Leipzig, 1877.

† Overbeck, Pompeii, 1884.

When in the middle ages trade guilds reached their highest popularity, there were in Germany countless "küttelhôfe" (an old term for slaughterhouse), which were nearly always situated outside the walls of the town—an arrangement mutually satisfactory to the butchers, who liked to obtain as cheap and as convenient a place as possible, and to the public authorities, who, because of the narrow and winding streets of the town, liked to remove as far from them as possible any probable means of disease. It thus came about that a much better control was obtained over the healthy condition of cattle, etc., to be killed, when they were slaughtered in the public "küttelhôfe," when each piece was counted and a duty imposed. In the Augsburg Record of Laws (1276) we find the following: "No butcher shall be allowed to kill either an ox, a sheep, or a calf elsewhere than in the slaughterhouse. Whoever disobeys this command must pay to the chief magistrate a heavy fine. But pigs he may be allowed to kill on his own premises." Similar commands are found in the Regensburg Laws of 1376.

Besides the "küttelhöfe" already indicated, these were also to be found in Strassburg, Zwickau, and Hamburg, and somewhat later in Liegnitz, Leipzig, Nordhausen, Dantzig, and Königsburg, and in the middle of the sixteenth century in Breslau, Berlin, Zeitz, and Gera. In many parts of Germany, particularly in Saxony, it was commanded, even in quite small towns and boroughs, that slaughterhouses should be erected on such spots where there was abundance of water, and that there should be a meat tax "for the purpose of keeping good order, and to prevent any unclean or unsound animals being killed." Each "küttelhöfe," in which country butchers also appeared to have killed, possessed a küttelmaster, who was sworn in as an official of the town.

Most of these buildings were situated near rivers, and occasionally near ponds, as in Zeitz, in order that all blood and waste material might be carried direct into the water. Several of these slaughterhouses are still in existence, as in Königsberg and Breslau. In Berlin, the third of the three slaughterhouses at one time existing was pulled down in 1842, the two others having been demolished by parliamentary command in 1810.

For the convenience of the butchers, especially in large towns, the meat markets were connected with the slaughterhouse, just as were the macellæ and lanienæ of ancient Rome.

Thus there were to be found at that time a considerable number of public slaughterhouses in which the meat was inspected by order. But when medical science suddenly advanced quite new principles, which practically meant that *diseased animals could be consumed without injury to health*, it is not to be wondered at that at the beginning of this century there were not only no new slaughterhouses, but there was a rescript issued by the Prussian Ministry of 1826 declaring it unnecessary to compel competent butchers to kill in public slaughterhouses. A succession of external events occurred before it was discovered that it would be much better to return to the useful system of public slaughterhouses, but this result was only reached gradually. Perhaps the example of other countries had some influence—for instance, that of France, which, as we shall see further, was always a pattern to other civilised states in this respect.

THE FIRST MOVEMENT IN GERMANY.

The reason that the erection of public slaughterhouses in Germany, especially in the northern parts, was so long delayed, was to be found, in the first place, in the fact that it was feared the butcher's freedom of trade might be too much limited by the rules which must be enforced. There was also much discussion as to whether the buildings would pay their own way or would need to be continually assisted at the expense of the rates, besides the possibility of a consequent rise in the price of meat. In spite of these scruples, the groundlessness of which will be shown in one of the following chapters, it happened that towards the close of the sixties the law of the 18th March, 1868, concerning the erection of public slaughterhouses in Prussia, began to come into operation, but this did not have much effect until it was amplified on the 9th March, 1881. It was only, however, after countless accidents from meat poisoning, when *trichinæ epidemics had alarmed the community, and after the repeated efforts of medical

* Regarding the trichinæ epidemics the worst was in Hettstädt in 1863 (160 attacked, of whom 28 died), Hanover 1864-65 (over 300 affected), and Hedersleben 1865 (337 seized, of whom 101 died). According to Johne there were in Saxony between 1860-89 no fewer than 109 epidemics, with 3,402 attacked and 79 deaths. The cases from meat poisoning were no less dangerous, and of which may be mentioned these: Lahr 1886 (70 patients, 3 deaths), Fluntern 1867 (27 seized, 1 died), and Nordhausen 1876 (400 attacked, 1 death).

officers of the Society of Veterinary Surgeons and other guardians of the public health, that this result was obtained.

The new law became necessary because meat killed in other districts was brought into towns having a public slaughterhouse, where the meat underwent a thorough medical inspection before and after killing, and was offered for sale along with it. The more the traffic in such meat increased, so much the more was the efficiency of the protection offered to the consuming public by the inspection of all slaughterhouse meat threatened and made comparatively valueless. In the same way, the revenues of the slaughterhouses decreased, when private butchers could kill animals, or have them killed for them outside the jurisdiction of the town, and then bring the meat in and sell it there. It was when this new law was added to the older one that the latter became of real value.

Much was done by the district courts to influence the community by pointing out the important sanitary and economic advantages which would accrue to it on the erection of public slaughterhouses. The President of the Municipality of Königsberg wrote thus on the 9th Jan., 1886:

"The high importance of public slaughterhouses for the public weal has claimed the attention of both State and town authorities, as well as the interest of the greater portion of the public. The most important reason for such establishments is, above all things, the preservation of the public health.

"Shortly, in consequence of companies being formed for the erection of public slaughterhouses, the private butchers and private slaughtering by those not in the trade will decrease, and by this means there will be removed a great evil with dire consequences, caused by the careless casting away of animal refuse, which has tended to the pollution of air, earth, and water. By bringing all butchers' establishments under medical control, the populace will be guarded from the consumption of unhealthy or diseased meat.

"Not less important is the gain which will be attained by the easy practical discernment of contagious diseases, and by the possible preventing of the wider spread of such by the veterinary officials in these central places.

"Thus in public slaughterhouses a higher degree of cleanliness and usefulness will be attained than was ever reached in

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private establishments. Also, by the purchase of, as far as possible, unblemished animals, consequent on the public control, as well as the restraint exercised by the butchers over each other, there will of necessity be an improvement in the quality of meat, and ultimately the dangerous transit of animals through populous streets will be limited in a great degree by the erection of lairage accommodation in connection with the slaughterhouses.

"In appreciation of these advantages, even small towns have here and there resolved on the erection of public slaughterhouses. These recommend themselves all the more because they have proved that there is no confirmation of the assertion that such establishments will not pay their way. On the contrary, if they are conducted properly, with due regard to the laws of 18th March, 1868, and 9th March, 1881, such a substantial income results that the cost of the building, the conducting of the business and the payment of all expenses is so soon covered that a surplus is generally obtained after the first year, which may be employed in reducing the scale of charges.

"This experience has repeated itself with the public slaughterhouses which have been erected in this district. Just because these establishments have by their benevolent influence exercised such a generally healthful effect, the more urgent is the duty to increase the number of such establishments until there is one in every town in the district."

This circular letter was considered by the Government of such practical importance in the furthering of public health that the other municipal chairmen were invited to take cognisance of it. In consequence of this, other districts issued similar orders, as, for example, that of Posen, 29th January, 1891, which ran:

"In all towns which have erected a public slaughterhouse with compulsory inspection, it has been discovered that the number of diseased animals and pieces of meat entirely unfit for consumption by man is unexpectedly great, and that in such places where there is no slaughterhouse and no careful inspection of meat, the inhabitants are threatened with a far greater danger than is usually understood. In such districts, where a slaughterhouse is not yet erected, in order to bring the danger before every eye, it is considered judicious to make known in as wide a circle as possible the

results of the thorough inspection of butcher-meat which has been made in the existing slaughterhouses."

The following circular letter was also issued by the chairman of public affairs in Düsseldorf to the members of all the provincial courts of justice in the district on the 7th July, 1892:

"In spite of the fact that the economic and healthful advantages which the erection of slaughterhouses offers to the people in general are being appreciated more extensively among the community, and although in larger towns, generally speaking, the existing need is being met by buildings erected at the town's expense, yet there are a great many smaller towns which still possess no establishment of this kind. This is all the more to be regretted as experiments made in quite small towns have shown that the interest paid on borrowed capital and also the cost of up-keep can all be covered, and a well ordered control of the butcher's-meat business obtained to great advantage."

A circular letter from the chairman of public affairs in Stratsund of the 30th June, 1897, recommends the erection of slaughterhouses in towns of one thousand inhabitants.

In consequence of the activity shown by the magistrates the number of public slaughterhouses in Germany has greatly increased.*

THE HISTORICAL DEVELOPMENT OF SLAUGHTERHOUSES IN OTHER EUROPEAN STATES.

England. - In England the earliest information about slaughter-yards dates from the year 1338, and is contained in a decree to the butchers of Oxford forbidding them to kill in the town again, "because several persons of note had died from the effect of the foul odours." A general order was first issued by Henry VIII., which forbade slaughter in unwalled towns. Up to the present day there is still no law concerning the erection of public slaughterhouses to be used exclusive of any other, for, in the "Public Health Act" of 1875, by which the inspection of butcher-meat as well as the control of every sort of food is enacted, it is left to the inclination of every town council (par. 169) to erect a public slaughterhouse, to issue by town or county law, directions for conducting the same, and to

* The names of the various slaughterhouses in Germany are given in the German dition, but are not of sufficient interest to reproduce here EDS.

settle what shall be the fees for the use of the establishment. By the issue of a statute of this kind the determinations of the "Towns Improvement Clauses Act" of 1847 are reconsidered. A *compulsory* use of slaughterhouses cannot be insisted on, neither can the closing of the existing slaughterhouses be demanded. Thus, out of 1,083 towns, England possesses only eighty-four public slaughterhouses, and many of these are but little used.*

London itself is blessed with about six hundred *private* slaughterhouses, and does not possess a single public slaughterhouse for general use. The Deptford abattoir is used entirely for imported cattle.

However, in *Scotland*, the law of 1862 gives town councils the right to erect public slaughterhouses with *compulsory* supervision, and to forbid the further use of *private establishments*.

France.—According to Ch. Morot, the oldest record about a public slaughter-yard dates from the year 977 (*La Réole* in the Gironde). In both the following centuries we find numerous buildings of the kind all over the country. In Paris, in the reign of Louis VI. in the twelfth century, there were several common slaughterhouses.

While there were in all the other provinces public slaughterhouses, in most cases belonging to the town councils, there were in Champagne several called "*abattoir seigneurial*," which were the property of a company of great nobles.

It was ordered by Charles IX. in 1570 that public slaughterhouses should *not* be erected in the towns, but outside them, and must be in the neighbourhood of water. There were different designations for these in the various localities. For example, in Amiens (thirteenth century) they were termed "*l'écorcherie*," in Beziers (fifteenth century) "*la boqueria*," "*excoriador*," in Troyes "*la macequerie*," in Sommières "*la boucherie*,' in Aix (sixteenth century) "*la sannerie*," and in Avignon "*la tuadour*."

The butchers were compelled to kill those animals, the flesh of which was to be offered for public sale, in the public slaughterhouse. In some towns, as Chartres (fifteenth century), and Agen and Nimes (sixteenth century), killing was only allowed on *specially prescribed spots*. To many slaughterhouses, as, for example, Lunel (1366), a public market for the sale of meat was added.

* See list in Appendix.

As in Germany, so also in France. At that time the compulsory slaughterhouses served the double purpose of filling the town purse while controlling the articles of food.

By the laws of 16th August, and 24th August, 1790, the supervision of the slaughterhouses was undertaken by the police.

Of splendid value to the whole civilised world were the commands of Napoleon I., which, by the decree of 10th February, 1810, ordained that public slaughterhouses should be erected in all large and medium-sized towns in France, and, by a second decree of 15th November, 1810, specified that the permission of the magistrates was necessary previous to the erection of any *établissements insalubres, incommodes et dangereux*. After the ordinance of the 14th January, 1818, such establishments were commanded to be erected separate from dwellings in large towns of over ten thousand inhabitants—an order, which by the decree of 15th May, 1838, was extended to all towns. Under Napoleon III. a decree (1st August, 1864) was issued commanding the community to be refunded for the interest of the building capital, and the amortisation expenses; nevertheless, the killing dues must not exceed the cost of the upkeep and the management of the establishment. Further laws referring to this matter were issued on 20th July, 1881, 22nd June, 1882, and 27th March, 1894.

In 1807, Paris, in consequence of Imperial decrees, constructed five public slaughterhouses, which were to be models for the rest. These five establishments were in 1867 united into one large central slaughterhouse in La Villette.* Beside this great slaughter-yard (*abattoirs généraux de La Villette*), there are also three smaller ones—that at Grenelle, at Ivry (*l'abattoir de Villejuif*), and that at Fourneaux. The slaughter-yard at La Villette, which covers an area of about 38 hectares, is separated from the adjoining cattle-yard by l'Ourcy Kanel. In order to make the buildings answer modern requirements, a cold storage installation has been added.

Spain.—"More than a hundred years ago" (so writes Berlepsch in *Chronik v. Metzgergewerk*, St. Gallen, 1851), "the slaughter-houses and markets everywhere belonged to the public, and never to private parties." "Butchers" are distinguished from

* See Appendix for description of abattoirs in Paris.

the purveyor. The one kills the animal, the other sells the meat. Both receive, from a committee constituted for the purpose, (consisting of two Government officials, a notary and an Imperial excise officer) their payment per head for the animals killed. The animal must be in the slaughterhouse by two in the afternoon; at five or half-past, there appear in the building a doctor and a surgeon to examine the meat. That marked "faulty" is at once buried outside the town, and the rest is sent to the market and sold under the eye of the officers of justice. A special meat inspection order was issued on the 24th February, 1859, which held good for all provinces. According to this all animals destined for public consumption must be killed in the public slaughterhouses, or in a particular place set apart for the purpose by the magistrates. In each slaughterhouse there is both a veterinary meat inspector and a town official. The establishments are all under State and town control.

In Spain there are at present public slaughterhouses in the following twenty-six towns: Albacete, Alicante, Almanza, Bilbao, Barcelona, Castellon de la Plana, Ferrol, Jativa, Jerez de la Frontera, Madrid, Mahon, Malaga, Palma, Pampeluna, Reuz, Salamanca, Santander, Santiago de Compostella, Saragossa, Segovia, Sevilla, Sueca, Teruel, Toledo, Valencia, and Valladolid. Of these, those of Madrid, Barcelona, Jativa, Saragossa and Valencia are provided with large and well-arranged common markets.

Portugal.—In Portugal, according to the decree of 21st October, 1863, concerning the erection of trade establishments which have an effect either disadvantageous, annoying, or dangerous to public health, public slaughterhouses can only be built by the *permission of Government.* There are slaughterhouses in Coimbra, Oporto and Lisbon, the last of which has been re-erected with modern improvements. The inspection of the animals before and after slaughter, and also the oversight of the establishment, are undertaken by veterinary experts.

Switzerland.—In Switzerland public slaughterhouses have been in existence for nearly two hundred years in almost all places containing more than two thousand inhabitants. These establishments, often very primitive, belong partly to the community and are

partly the property of the butchers concerned in them. Public slaughterhouses with compulsory laws, for both large and small animals, have now been in existence for thirty-five years, and are to be found in Basel, Berne, Biel, St. Gallen, Geuf, Lausanne, Lucerne, Zurich, etc. The majority of these slaughterhouses are under veterinary control, but there are no regular laws by which they are controlled.

Belgium.—In Belgium there are public slaughterhouses in all the large and many of the small towns, especially since by the law of 4th August, 1890, the inspection of meat has been regulated by the State. In Brussels, since 1842, and in Antwerp since 1875, there have been large slaughtering establishments.

Italy.— Since the Regolamente of 15th August, 1890 (Art. 6-73), public slaughterhouses in towns with more than six thousand inhabitants have been compulsory in Italy, which are under the control of medical officers. The law contains special instructions as to the erection of such establishments.

In 1780 there were in *Venice* numerous slaughterhouses situated on bridges over the water.

Austria.—In Austria, since 1850, large and medium-sized towns have been commanded to build public slaughterhouses ; but it is only since the Epidemics Law of the 29th February, 1880, that the inspection of meat has been undertaken by medical men. In 1895 the erection of associated pig slaughterhouses in Vienna was ordered by the Government, and it was resolved by the Association of Butchers there to undertake this, for had they refused, the Government would have built them themselves out of the public purse.

Bohemia.—In Prague the compulsory slaughterhouse system was brought into practice by the law of 9th March, 1889, both in its suburbs and in the districts surrounding it.

Russia.—In Russia there is no law which compels either the erection of public slaughterhouses or the obligatory inspection of meat. Before 1882 there were no public slaughterhouses, but now these are to be found in St. Petersburg, Moscow, Odessa, Reval, Libau, Wilna and Riga, these being all common institutions.

Poland. — In Poland the conditions are somewhat more favourable. Since 1811 there have been public slaughterhouses, and only in these are animals killed. The rate of slaughterhouse dues has been increased by special command

since 1820. In the year 1867 there were public slaughter-houses in 184 places, three in Warsaw alone. The latter were at first managed by Government, so as to have a strict control over the consumption tax; since its abolition they have been under the management of the town authorities.

Denmark.—Denmark* has public slaughter-courts in five towns—Copenhagen, Odense, Aarhus, Horsens and Ribe.

Sweden and *Norway.*—In Sweden and Norway there are *no* public slaughterhouses, although in Norway, by the laws of 27th June, 1892, and 27th July, 1895, the supervision of the meat supply of towns of more than four thousand inhabitants has been obligatory.

Holland.—In Holland, by the law of 2nd June, 1875, the right has been given to communities to issue local orders, according to which slaughtering is confined to *one* special place. In spite of this, there were in all Holland, till recently, only five slaughterhouses—in Rotterdam (1883), Amsterdam (1887), Herzogenbosch, Maestricht and Venlo; only the first two are fitted with modern apparatus. New establishments have lately been opened at Groningen, Roermond, Leiden and Utrecht.

Bulgaria.—In Bulgaria, since the decree of 5th and 17th September, 1880 (renewed 1886), killing is only permissible in slaughterhouses erected for the purpose. These must be situated as near as possible to some water. The inspection of the animals before and after slaughter is in the hands of a veterinary surgeon. Where there is no such official the inspection of meat can be undertaken by a doctor. (Law of 1889.)

Roumania.—By the laws of 27th May, 1882, and 19th May, 1890, it is compulsory in Roumania that *every* town *must* possess a public slaughterhouse, in which, without exception, all animals destined for human consumption *must* be killed. The supervision of the slaughter-yards must be in the hands of a veterinary surgeon. The erection of such institutions can be carried out by the sanitary authorities, who have control over the buildings in which operations are carried out detrimental or dangerous to public health. Permission for the erection of such buildings has to be granted by the Minister of the Interior.

* In Denmark there are many slaughterhouses which are used principally for the slaughter of pigs, but in which there is also provision made for slaughtering cattle. All are under official supervision.—EDS.

Greece.—Generally speaking, there are in Greece no public slaughterhouses; but instead of these there are sheds and markets outside the towns which belong to the corporations, and are let out to farmers, who receive a fixed sum from individual butchers for every animal killed. No animals may be killed by the butchers, even although their premises and lairages are invariably outside the towns. The Greek Government has been in communication for some time with a foreign company, which desires to erect large slaughterhouses in Athens and Piræus, in consequence of the law of February, 1896, which directs all animals for public consumption to be killed only in public slaughterhouses belonging to the State, where the animals are to be examined before and after slaughter by military veterinary surgeons.

Turkey.—In Turkey there are *no public* slaughterhouses, either of State or of common property.

In other countries outside Europe, there are few public slaughterhouses; for the numerous "stockyards" of *North America* cannot be called such. In *Guatemala* there is a State slaughterhouse outside of which no animal dare be slaughtered. The building of a large slaughterhouse with modern appointments has been planned for *Havana**.

In *Surinam* the erection of public slaughterhouses has been opposed for a considerable time. Since 1694 meat inspection by Jewish methods has been in operation.

In *Tunis*, in *Africa*, there has been for several years a very finely appointed common slaughterhouse, and in Madagascar the erection of such an establishment by the State is under consideration.

* This was written before the termination of the Hispano-American War, 1898.—Eds.

CHAPTER II.

LAWS RELATING TO THE ERECTION OF PUBLIC SLAUGHTERHOUSES.

The following enactments govern all the proceedings in Germany:

(a) The Prussian laws of 18th March, 1868, G.S. 277, and 9th March, 1881, G.S.S. 273, together with explanations and extracts on the necessity for such places, also reports of commissions and discussions in Chambers of Deputies, etc., and judicial decisions. The clauses are given below, with the various explanations, etc.:

Par 1.—In those parishes in which a public slaughterhouse is erected it can be ordained by parish law that within the entire district, or a portion of the same, every or any kind of animal must without exception be slaughtered therein, according to the orders at present in force.

The design of the law is that the public slaughterhouses should be laid out, erected and managed by corporations. The question, however, arises whether it would not be better that the erection and management be left to the spontaneous action of the trade guilds, and only bind the corporations to the advance of a sum of money (to be gradually returned with interest) to cover the whole cost, or at least part of it. This has already been tried in some German states—in Würtemberg, for instance. But the Commission on this subject held that the principle of Prussian law is preferable, treating it as of essentially sanitary and police interest, and therefore *public*, the protection of the public being more judiciously exercised by magistrates than by private parties. Further, by dealing with these places as corporation property, it can be assured with greater security that if

such buildings are required they will be erected; and, lastly, as a public undertaking, a greater guarantee will be offered for their continuance, as well as providing the expenditure to be incurred. Nevertheless, the law in no way excludes the erection of public slaughterhouses by private companies or by butchers' guilds. If in any town a company of butchers are willing to erect such a building, and if they offer the requisite guarantee for the judicious management of the same, they are allowed to do so. But in such cases, where private companies undertake the erection of the buildings, they are answerable to the local authority (see Act, par. 12)—a judicious precaution in the public interests.

The Chamber of Deputies determined, on the 27th February, 1896, that a regulation ordering all slaughtering in a certain parish to be undertaken in the slaughter-yard of the neighbouring parish (Rheydt) was valid; for it is not in opposition to the laws of 1868 and 1881.

This law does not include the killing of pigs by private parties for their own consumption.

Excerpt from the Act of 1868: "The order by which everything in connection with the slaughtering of animals is rendered compulsory, has its foundation in the prevention of all nuisances attendant upon the cleaning and cooking of the internal parts of animals in private butchers' establishments. The compulsory laws in this direction will be extended as much as possible; lard-rendering in such places must be discontinued, and be carried on under the supervision of officers appointed by the corporations. By reason of par 1, the congregations of synagogues may erect a slaughterhouse of their own if there is a necessity for it."

The plural is here used advisedly, to prevent any possible misunderstanding concerning the number of slaughterhouses in any one place. There is no law commanding only *one* such building.

Resolutions of corporations can be passed to forbid the future use of other than public slaughterhouses:

1. Where guilds or such other corporations have properly fitted and conducted slaughterhouses.
2. And where there is no need for slaughterhouses not under the management of these guilds.

Par. 2. By the resolution of a corporation a public slaughter-house can, after erection, come under the following regulations:

1. That all animals slaughtered shall be submitted to an inspection by experts before and after slaughter.
2. That all fresh meat not killed in the public slaughterhouse shall not be offered for sale in the parish of the corporation *until it* has undergone an inspection by experts and paid dues to the corporation treasury.
3. That in inns and restaurants fresh meat which is imported from elsewhere must not be prepared for use until it has undergone a similar inspection.
4. That in the open market, and also in private establishments, fresh meat not killed in the slaughterhouses shall not be offered for sale *alongside* of meat killed there.
5. That in public markets, belonging to and conducted by corporations of cities and towns, *only* such fresh meat as has been killed in the corporation slaughterhouses shall be offered for sale.
6. That such persons as pursue the avocation of butchers, or trade in the sale of fresh meat, in the district under the control of the corporation, shall not be allowed to offer for sale meat which they have not killed, or had killed for them, in the public slaughterhouse, or in some other slaughtering place within a radius fixed by the corporation.

The regulations for the inspection (Nos. 1, 2, and 3) and the tariff for the dues to be levied (Nos. 2 and 3) are in every case settled by the order of the corporation, and are by that body made known to the public. In the regulation for the inspection of meat not killed in the public slaughterhouse (No. 2) it can be ordained that the meat be shown to the inspector in large pieces (sides or quarters), and, as regards smaller animals, in the whole carcase; the dues must not exceed the cost of inspection.

The orders Nos. 2-6 can only be carried out in conjunction with order No. 1, and with compulsory slaughter (par. 1). They are of no use for such parts of the corporation district, and for such sorts of animals, as are excepted by par. 1.

In conclusion, the corporations are at liberty to use the orders Nos. 2-6 in their entirety or only partially, and to employ the individual regulations with the utmost rigour of the law, or in a modified state.

Par. 3. The corporation laws mentioned in pars. 1 and 2 are only valid when the permission of the governing bodies of the district has been obtained.

The prohibition of the use of other than public slaughterhouses (par. 1) comes into effect six months after the publication of the resolutions of the corporation, unless the latter specify an even longer respite.

New private establishments must not be erected after the date of that publication.

Par. 4. The community is bound by duty to manage and maintain the public slaughterhouse in accordance with the necessities of the place.

If the corporation gives up the establishment, it is then put into the hands of the military district committee.

Par. 5. The corporations are authorised to levy taxes on the meat to help in the up-keep of the establishment, as well as for the payment of the meat inspectors. The tariff of dues must, by the resolutions of the corporation, be fixed for a year at least, and must be brought to the public knowledge.

The extent of the various charges in the tariff must be so determined that:

1. They must cover the expense of inspection (par. 2).
2. They must not exceed the expenses entailed in the up-keep of the establishment, the cost of management, the interest paid on borrowed capital, the gradual amortisation of the capital outlay, and the necessary sums that may have to be paid for indemnification.

A higher interest than five per cent., and a higher amortisation rate than one per cent. (together with the interest gradually saved) need not be reckoned on.

Par. 6. The practical nature of such an establishment, founded on such principles as have been laid down in the foregoing pages, cannot be gainsaid.

Par. 7. Compensation must be given to the owners and users of the private establishments of the kind existing in the district under the control of the corporation for the undoubtedly substantial injuries which they suffer by being deprived of the buildings and arrangements for the conducting of the butchering business, in consequence of the orders stated in par. 1. In the calculation of the

injury done it has especially to be taken into consideration that the revenue which can be obtained from the ground, building, and outfit in other hands may be different from the return which they have hitherto yielded.

An indemnification for losses which might arise from disturbances in trade is not permitted.

Par. 8. With respect to the lease or letting contracts of private establishments, such contracts must be closed at the latest by the expiration of the time given to the tenants of such establishments in par. 3.

An indemnification claim is allowed on account of determination alone, and prevents the tenant and landlord being at variance as to what each is entitled to. (By the insertion of this word *alone* the Commission on Manor Houses of 1868 anticipated fully the protection of private rights.)

Par. 9. The owners and tenants of private butchers' establishments are obliged to lodge all claims for indemnification against the corporation with the local government within the limit of time given in par. 3, or the claims will not be entertained.

The magistrates appoint a commissioner, who, with the assistance of two assessors, has to prove the claim and to ascertain the amount of indemnification which should reasonably be paid.

One of the assessors is chosen by those suing for damages, the other by the corporation. If they are not chosen within a given period of at least ten days, determined by the commissioner, he himself appoints assessors.

Par. 10. On the termination of the inquiry the commissioner hands in to the local government court an account of his investigations and his own opinion on the matter. The court then decides the case and draws up an award stating the sum that it decides should be given, with reasons for the assessment, and sends a copy of the award to each of the parties interested, through the commissioner.

Par. 11. Each of the parties interested may appeal against this resolution, provided he does so within a period of four weeks from the day he receives the award. After the expiration of this period the award has the effect of a legal judgment.

Par. 12. The present law also holds good in the case of a corporation not itself erecting a public slaughterhouse, but which

grants the necessary powers for this purpose to others. In this case the corporations abide by the obligations laid upon them in these laws. The mutual relations between the corporation and the enterprise are regulated by a contract subject to the authorisation of the District Committee.

Par. 13. Anyone acting in opposition to the provisions in par. 1, by either slaughtering an animal elsewhere than in the public slaughterhouse, or being associated with any business in connection with the trade in the hands of the corporation, acts in opposition to the orders set forth in par. 2, and will be punished for each offence by a fine not exceeding 15 shillings or by imprisonment.

(*b*) The State Decrees from July 1st, 1883, also apply as follows:

Par. 23. The supreme court has decided that in such districts where public slaughterhouses exist in sufficient numbers, or are about to be erected, the further use of private slaughterhouses or the building of new establishments of the kind, is to be prohibited.

Par. 51. On account of the great disadvantages and dangers to the general public the further use of such business premises will be prohibited by the highest court of magistrates. Still, the occupier must be granted compensation for the injury he sustains.

(*c*) Laws concerning public slaughterhouses in the Kingdom of Saxony from 11th July, 1876 (from the Statute Book of Saxony, par. 305).

Par. 1. For places in which public slaughterhouses exist in sufficient number or are to be erected, it may be prohibited by Statute to allow (*a*) the erection of new private premises; (*b*) the further use of existing private premises.

Each such statutory order requires for its validity the sanction of the Ministry of the Interior.

Par. 2. Should the owners of private premises claim indemnification money, they are to obtain such from the corporation.

Par. 3. The Ministry of the Interior is empowered to see that the authorities under its control carry out the orders of par. 1, etc.

(*d*) The slaughterhouse laws in the other States of Germany.

In these States, laws and commands referring to the erection of public slaughterhouses are issued, which are practically copies of the Prussian slaughterhouse laws.

In the South German States of Bavaria, Würtemberg, and Baden, meat inspection is general, and also the number of slaughterhouses is very great, still the regulation of compulsory slaughter is left to the orders of the police of the districts.

The following extracts from various reports are interesting as showing how many of the objections and recommendations with reference to the clauses of the different Acts have been met:

Extract from Commissioner's Report, 1868: "Exceptions will only be allowable when they are for special reasons perfectly unavoidable. Further exceptions are excluded. If a public slaughterhouse exists, private premises must no longer be used."

It was advanced by some commissioners that possibly there exist in various towns private premises, where pork is pickled in great quantity for export; it appears scarcely feasible to transfer all the work connected with this business to a public slaughterhouse, neither would it be practicable to carry on the different portions of the work in two separate localities, that is, to have the animals killed in the slaughterhouse and the pickling done in private premises. If, therefore, the power is not given for the existence of private slaughterhouses, the law will have brought a lucrative business to a standstill, or make it difficult for the corporation to erect a public slaughterhouse there, because the magistrates would hesitate to fall in with an arrangement which would make away with a flourishing business. It was, therefore, proposed to add the following to par 1:

"In the corporation decree it may be decided that the prohibition of the further use of other than the present public slaughterhouse be only applied:

"1.—To slaughterhouses commonly known as such.

"2.—But not to those for killing animals to be dealt with outside the regular butchers' trade."

By this amendment the corporation were to have the power of examining these private slaughterhouses, although the tenants or owners were not bound to use the public slaughterhouses.

The majority of the Commissioners have declared *against* this proposed improvement. It was asserted that this amendment would shatter the whole principle of the law. Private premises could not be examined according to the law, and it could thus easily happen that the further use of private premises would be granted to butchers with large businesses, while it would be denied to those with a smaller trade, because the former could bring more influence to bear on the magistrates, thus allowing an inequality in treatment which would not be approved. Besides, in every case the magistrates would, if they issued such an order, have to transact a great deal of business with butchers in the examination of their private premises, as the latter mostly prefer to kill at home, which was thus another reason for the refusal of the final amendment.

Extract from Commissioner's Report, 1880: "In the course of the discussion doubts were entertained by some of the members as to the introduction of compulsory slaughter and inspection on the ground that by taking such measures the sale of cheap, though perfectly sound, meat is prevented. This would not so much affect the large farmers as the small dealers, whose whole business is to rear cattle of inferior breed for the market. The poorer class of consumers, who are accustomed to buy such meat, would also suffer.

"Against these objections it is necessary to go back to the conditions of the law *before 1868*, although it is not desirable. We cannot conduct the whole concerns of the country for the advantage of the producers alone, but must keep in view the sanitary gains. Besides it is doubtful whether the erection of a slaughterhouse and the meat inspection connected with it will be hurtful to the producer. Poor meat, according to the letter of the law, may not

be sent back from the market, but only diseased meat, injurious to health. Healthy animals can be bred by the small dealer just as well as by the greater breeder."

From Commissioner's Report, 1880: If the original Government document with regard to the orders in par. 2 does not everywhere specify that *fresh* meat is meant, and if the authorities have everywhere inserted the word "fresh" before meat, this change is to be regarded as editorial. *The law is a slaughterhouse law, and only sets itself the task of regulating the meat traffic in so far as it may belong, in the narrowest sense, to the province of the slaughterhouse. All the decisions of the law refer only to the meat which goes out of the slaughterhouse, not at all to it when further dealt with, that is, dried, pickled, smoked, or preserved.*

"Sanitary and police measures with regard to those sorts of meat, the inspection of which is fraught with considerable difficulty, must be adhered to, for instance, the articles of diet law of 14th May, 1879. It is no light task for the corporation to guide the traffic with fresh meat successfully."

From the transactions in Manor Houses, 1880: "The Government document will alone further and secure the laying out of slaughterhouses, in that it orders the commons to force the matter consonant with the regulations surrounding the slaughterhouse, while doing the best for the butchers. Therefore the law will not prohibit the importation of meat from elsewhere, it will also not certify fresh meat which has not been submitted to inspection when the animal from which it was obtained was still alive. The law thus sets forth in its preamble what is quite equivalent to the prohibition of the importation of fresh meat not previously examined, because in the country arrangements do not exist to make such an inspection possible. The law limits itself to giving the corporations (or to the community) the right of determining whether to inspect meat coming to them which is already killed. It further leaves to the communities the levying of dues on such meat, but it forbids the imposition of compensation dues. The dues must be limited to the amount of the expenses. In addition, the public will have the opportunity of choosing between meat of the first and second quality, between the flesh of animals which, while still living, have been examined by the slaughterhouse authorities, and that which has been brought there after slaughter. It will eventually be of great influence in the founding of markets in which only absolutely sound meat will be offered for sale. Lastly, it will, above all, pr vent butchers and salesmen from offering for sale meat which they have killed, or had killed for them, in private establishments beyond the jurisdiction of the town in which they practise their profession, by the side of meat coming from the slaughterhouse."

Order of 1880. Amongst the measures proposed in a petition presented to the body for the Improvement of Public Health and signed by a large number of towns' magistrates, the most important is that concerning the *prohibition of the importation of fresh meat*, even although the prohibition be limited to the sale of it. Moreover, it cannot be doubted that in this way the sanitary aim will be most perfectly attained by the introduction of compulsory slaughter, as the healthy condition of meat can only be ascertained with absolute surety, if the animal is examined before and after slaughter; it would add not a little to the financial results of the slaughterhouse establishment if all meat brought into the jurisdiction of the management thereof was compelled to pass through the slaughterhouse. It will thus be scarcely necessary to empower the corporations to prohibit the importation of fresh meat, as this measure will almost make the sale of fresh meat a monopoly for the butchers living within the jurisdiction of the corporation. The privilege granted to other butchers to kill their meat in the town premises alters this. It is to be feared that this interdict against importation will raise prices and lead to a decrease in the consumption of meat by the lower classes, against which must be balanced the former danger due to the purchase of unsound meat. It may further be questioned if the corporation may not at least be empowered to allow meat from other places to be sold in the town if it comes with a certificate attesting that it has already been examined and found sound both before and after slaughter. This measure would offer but little security from a sanitary point of view compared to the unconditional importation prohibition, in its practical carrying out, because the *requisite veterinary examination* in country districts would be conducted with great difficulty. The measure, therefore, is not feasible.

'Therefore there can be no doubt that the corporations should be empowered to subject *all imported meat destined for sale to an inspection by experts at a tariff payable to the corporation.* Such an examination of meat killed elsewhere is not so satisfactory as inspection before and after killing, but it offers a guarantee not to be underrated, when it is stipulated that the meat be submitted to the experts in large pieces (sides and quarters). According to the present state of the law, the examination can only be made by command of the police; if it were under the control of the State or the corporation a fine could not be exacted. It appears perfectly practicable to empower the corporations with the inspection of imported meat, to take such entirely into their own hands, and organise the inspection thereof, seeing they are already authorised by pars. 2 and 5 of the law to subject all animals coming into the slaughterhouse to a like examination, subject to a due being paid to their treasury.

"Par. 5 of the law contains the order that the duties on the animals examined should not exceed the costs of inspection. The same principle should hold good regarding the duty on imported meat. It would not be right to allow the levying of a so-called compensation due, that is, of a tax which corresponds to the tax to be paid by the private butchers for the examination, and at the *same time for the use of the slaughterhouse*, and thus to substantially raise the price of the imported meat, which is generally of a poorer quality, and is for consumption by the poorer classes. *Only such imported meat as is to be offered for sale within the jurisdiction* is to undergo inspection. It would not be practicable to insist that those persons who prefer to have *meat imported for the use of their own household* should have it examined. Nevertheless, the corporations can undoubtedly be authorised to subject to examination not only fresh meat offered for sale in a raw state, but also if prepared, and also *all meat destined for sale in hotels and restaurants*."

From Com. Report II., 1880. An amendment was suggested that the following should be added to par. 2:

"That pars. 2 and 3 shall not apply to such meat as has been killed in the public slaughterhouse of another corporation and examined there according to the requirements of par. 1, unless the duration of the transport has been long enough to permit of deterioration."

The mover of the amendment holds that it appears unnecessary to inspect meat which has already undergone examination in a public slaughterhouse. It would lead to difficulties in the importation and consequently to a rise in the prices. But if the distance is so far that a deterioration of the meat is to be feared because of the transport, then an inspection is necessary.

The representatives of the Government declared themselves against this amendment, and remarked:

"According to the amendment it would be left to the judgment of the trade managers mentioned in Nos. 2 and 3 whether they would submit meat brought from the slaughterhouse of another town to inspection or would not, because to them would be left the testing of the question as to whether the meat be spoiled. But that is manifestly inadmissible. *All* imported meat, including that brought from another public slaughterhouse, should be submitted to the examination of appointed inspectors. Of course, this inspection of imported meat should be limited to testing if it has been spoiled by carriage. But such a stipulation as to how it can be proved that the meat really came from another public slaughterhouse does not come within the law, but under the regulations of the corporation decree. On the other hand, it may be remarked that by the introduction of the amendment the danger is incurred that the slaughterhouses in the neighbourhood of the towns may be managed carelessly and with insufficient inspection. If such a course is allowed, the inspection must be exercised in an upright and thorough manner."

Inns and restaurants. From Com. Rep., 1880: To No. 3 of par. 2 it is advanced with reason that such an order would be a great hardship to the proprietors of hotels and restaurants, would tend to raise the price of meat, and would be difficult to carry out

Against this it may be remarked that the hotel-keepers, etc., would only have to produce books proving that the meat they have has been obtained from places where inspection is in force. This supervision is specially necessary in hotels, because there the proprietors do not themselves use the meat, but set before the public what would otherwise be unprotected. If the community do not think this control practicable, then they need make no use of this order, but it is only proper to allow them to exercise such a right if they wish.

The Government officials say: "The rule that meat used in hotels and restaurants should be liable to inspection is correct in principle, and is of no small practical importance. It can be left to the consumers whether to insist on this inspection or not, because the danger incurred affects only themselves."

Added to this, the public are so much less in the position of being able to test, or have tested, cooked meat offered for sale in inns, etc., and the doubts concerning the practicability of the inspection would not in any case be entertained by all the community. In some of the towns, where compulsory slaughter is already in operation, *imported meat may by police order be subjected to a still further inspection* than is proposed in the decree, although no difficulties had arisen at the beginning. For instance, in Bochum an order was made according to which all imported meat, *even that brought to private consumers*, had to be subjected to inspection. In Würtemberg also there has been in force for the last twenty years a compulsory inspection of meat offered for sale, and also of that in use in households, from which it may be gathered that there would not be insuperable difficulties in the way of introducing Nos. 2 and 3 as corporation rules.

From Com. Rep. II., 1880: Some of the members urged that the enforcing of No. 3 would be attended with great difficulties, but on the other hand it was advanced that it would be a great boon to have the eating houses frequented by the poorer classes of the population under control of this kind.

Imported meat shall not be offered for sale in the public markets or in private establishments alongside of meat killed in the public slaughterhouse. As the traffic with imported meat is not to be prevented in the communities which have erected public slaughterhouses, there will be two classes of meat offered for sale, the meat killed in their own slaughterhouse and that which has been imported, which, although it has been inspected, cannot be guaranteed with equal certainty. Also, without regarding merely the sanitary conditions, the slaughterhouse meat is as a rule of a better quality than the imported meat; it has been found that after a very short time only animals of good quality pass through the slaughterhouse, because the butchers are *ashamed to kill an inferior animal before the eyes of their competitors in trade.* It is, of course, of great importance that the general public should understand which class of meat they are purchasing. Only when the possibility is given to each consumer of providing himself with thoroughly reliable meat does the slaughterhouse plan attain its full worth. So, too, do native butchers have a special interest in desiring that this meat which has gone through the slaughterhouse be distinguished from the imported goods. The demand for a so-called compensation due has a certain justification so long as both classes of meat may be purchased in the district without being distinguished from each other in any way, and the greater value which the slaughtered meat obtains quite makes up for the money paid to obtain it. It recommends itself on these grounds, that the corporations are invested with the power of distinguishing between the two classes of meat for the benefit of the public.

Such a rule is already in force in individual places by order of the police. The easiest way to carry out this would be to conduct the whole traffic with fresh meat in the public market places. This measure would be so arbitrary, and the regulating of it be fraught with such difficulty, that in the meantime the corporation must lay aside all thought of such an extensive alteration.

An important step in the carrying out of such a distinction has already been made, the corporations in some places having built meat markets in which only slaughterhouse meat may be sold.

It has been advanced that in private establishments this separation will be accompanied with difficulties, and that such impracticable orders will prove an incentive to contravention. If it is urged that the meat may be known by certain marks the answer is that when it is sold in *large* pieces such may be possible and practicable, otherwise it is not. If it is, nevertheless, put into practice it would be a great barrier to free trade.

The Government Commission vindicates the disputed order in the following way:

"The separation of slaughterhouse meat from imported goods, particularly in towns where no use is made of the privilege to inspect imported goods, is of the greatest importance for the consuming public on the one hand and also for the native butcher, and is clearly laid down in the law in question. This separation is easy to carry out in market traffic, in that *one part of the market may be reserved for slaughterhouse meat and another for imported goods.* If the practicability of the separation offers greater difficulties in the case of private establishments it must be remembered that local separation is not necessary, but rather that every arrangement may be made to acquaint purchasers whether they have slaughterhouse meat before them or not. For example, in St. Johann the trade mark for slaughterhouse meat is printed on white paper, and for imported meat the paper is blue. Whoever has meat for sale in the jurisdiction of the corporation must make known the result of inspection by this trade mark, and it is further ordered that meat salesmen who have imported meat for sale in their shops must make such known by hanging a slate in their shop windows declaring in legible writing that this is the case." The amendment that, instead of saying "only fresh meat which has been killed in the public slaughterhouse shall be offered for sale" in public markets, it should be said that "fresh meat of *animals* can only be offered for sale if it has been killed in the public slaughterhouse" is made clear by the mover to be only an editorial alteration. Otherwise the words of the Government document would lead one to suppose that birds, game, etc., must not be permitted to be sold in the meat markets.

From Com. Rep. I., 1880: "That in public markets in the possession of and under the management of corporations, fresh meat which has been killed in a public slaughterhouse should be offered for sale separated from that fresh meat which has not been killed in a public slaughterhouse." The mover explains this motion in that by a public slaughterhouse he understands a corporation establishment for the slaughter of animals, and then proceeds that he holds it desirable that both descriptions of meat be offered for sale in the public market places, so that the imported meat be not thrust out from the public market into the shops, but that rather it may pass through the market and be branded, and that further to the first class shall belong not only the slaughterhouse meat of the town itself but also any slaughterhouse meat from any other town.

Against this it would be remarked that such a law encroaches on the private rights of the community. The corporations who build a market must also have the right of selling in it such meat as they hold judicious. In most cases the public will be able to buy either kind of meat, but no limitation can be laid down here.

The Government representatives replied to the preceding amendment that a greater weight was laid on No. 5 than it in reality possessed. This No. 5, comparing it with No. 4, contains no new authority for the corporation, but rather gives an example how the separation of the two varieties of meat can be practicable in public traffic. As the corporation has not the privilege of *excluding from this traffic articles which, according to law, belong to the traffic of the weekly market*, then those corporations who, by reason of 4 and 5, confine the public traffic of slaughter-house meat markets remain obliged to appoint other market-places or markets for the traffic of imported meat in sufficient number and size. If, now, the amendment demands that both kinds of meat, even if in separate rooms or places, are to be offered for sale in the meat markets, then the privilege accorded to the corporation in No. 4 to carry out *separated* sales of meat in the market-place without further limitations would be in a way restricted without sufficient grounds. The amendment further institutes a new principle of separation for both kinds of meat. While in No. 4 the meat killed in the public slaughterhouse of one especial town is placed against all other meat, the amendment reads: The meat in *a* public slaughterhouse, that is, the public slaughterhouse of any town whatever, placed against meat killed on private premises. Without mentioning that the law would become somewhat doubtful, it cannot be right for meat killed in the slaughterhouses of other towns to be put on an equality with that of the town in question, as the question of identity would raise difficulties, and it could not be guaranteed that the meat would have suffered no alteration of its condition during transport.

From Com. Report II., 1880: There was an amendment advanced to omit the par. No. 5. The mover reasoned that No. 5 contained a direct summons to build meat markets, and make them a town monopoly. Other members have expressed doubts against No. 5 of par. 2, as the corporations may exercise their privilege in connection with public meat markets to exclude even the trial of imported meats, and they may prefer erecting meat markets in connection with the slaughterhouse premises instead of general market halls, which for great towns is desirable, as the removal of the general weekly market from the public market-place to a covered market hall must be acknowledged as worth striving after. If a Corporation erects meat markets, and then has the right to permit only such meat as is killed in their public slaughterhouse to be offered for sale, then the *imported* meat will be banished to the open market-place. As soon as the buyers have the choice presented them, either to purchase their goods set out in the open air, exposed to all kinds of weather, or protected against wind, rain, snow, and dirt in the public market halls, necessarily the decision of the general public will be in favour of the market halls. The markets in the open air could not withstand this competition. The consequence would be to stop the importation of fresh meat, which, in the interest of the consumers, is to be regretted. It is, therefore, proposed to reject No. 5.

The Government representatives repeated their explanations of 24th June, 1880 (Report I.), and emphasised especially that if the corporations proceeded progressively, *first* with the erection of covered markets, and next prepared to erect another such hall for the meat produced in the public slaughterhouse, there would be no reason to object to this plan.

This opinion was shared by the members of the Commission, and it was remarked that the fear of the mover of the amendment was quite groundless. The towns had not only the one-sided interest, that of making their own schemes profitable, but it was to their advantage also to provide their inhabitants with good cheap meat. Against the separation of the different sorts of meat no one can object. A limitation of the market traffic is not likely to ensue.

Such persons as pursue the business of butchers, or are employed in the sale of fresh meat as a standing occupation in the district under the control of the corporation, shall not be allowed to offer for sale in the said district meat of animals which they killed or had killed for them other than in the public slaughterhouse, except in another killing place within a radius fixed by the corporation.

Order v. 1880. The proposed measure to forbid people living within the radius of the town from killing beyond its jurisdiction is of great importance. That the native butchers cannot at the present time be prevented from erecting new private premises outside the jurisdiction of the town and, perhaps, just on its boundaries, is a great danger to the stability of the public slaughterhouse. The rapid growth of slaughtering places in the neighbourhood of Berlin during the last few years offers a striking example of this. It may be expected that the corporation traders will not practise their calling in any way threatening the welfare of the town, and from this point of view it appears that the prohibition in question is justified by the measure that the killing in places outside the jurisdiction is not to be entirely forbidden, but only so far as it suits the purposes of the corporation management. The prohibition *also is not for persons living within the jurisdiction*, but for those who manage butchers' businesses or sell meat within the jurisdiction as a fixed occupation, without regard to whether their dwelling place is within the town radius or not. This is the true conception of the law, which relieves every doubt that it is not designed to forbid to the native butchers and meat salesmen the purchase of imported meat, but rather to compel them to make use of the town slaughterhouse when they kill or have meat killed for them.

From Com. Rep. of 1880: It is explained by the Government representatives that in the carrying out of this order care must be taken that the *butchers and meat salesmen* shall not be forbidden to *offer for sale such meat* "as has been killed in another town or in the slaughterhouse of another town," but only the sale of such meat "as they *themselves* have killed or had killed for them in another slaughtering place, or the public slaughterhouse of another town." If the former were insisted upon, the native butchers, etc., would be forbidden to buy imported meat and offer it for sale within the radius of the town limits. The imported meat would thus only be offered for sale by other than townspeople in the weekly market or by hawkers. To raise such a barrier before the trade is far from being in the intention of the law. It is only designed to empower the towns to lay upon their butchers and meat salesmen the obligation to use no other killing place than the public slaughterhouse for the killing of those animals the meat of which they purpose offering for sale within the prescribed radius. It has met the pressing need of affording to the towns who build public slaughterhouses a protection against the butchers killing their meat outside and then bringing it within the town radius to sell. If the native butcher *desires to sell his meat without the jurisdiction of the town*, he will not be prevented from using another slaughtering place to kill in; but should he kill for the purpose of sale within the town radius, then he can be compelled to use the town slaughterhouse, and not endanger the existence of this establishment by the use of those of other towns.

Against this it was urged that there are still cases where, by the application of Clause No. 6, a quite legitimate and useful traffic, which is not an evasion of the slaughterhouse law, would be put a stop to. The owner of a butcher's business in Berlin has, in Elberfeld, Cologne, and Düsseldorf, shops for the sale of meat which he has killed in the slaughterhouse of the Berlin Cattle Market Company, and in this way exercises a salutary influence on the reduction of the price of meat. If No. 6 was to be put in operation in one of these towns, this useful traffic would have to be stopped, for it refers to meat which a meat salesman in the town has had killed in another slaughterhouse *not* in the town.

On the other hand, it was shown that such cases were very rare when, without the intention of evading the law, the butchers or meat salesmen of a town possessed a butcher's business in another place, and imported the meat from there. For these cases means could be devised by the corporation for the application of No. 6 within sufficient modification so as not to prevent honest trading.

The Government representatives considered these objections, and agreed that in the towns mentioned the evasion of the law would be *hindered*, and the importation of meat from Berlin still be maintained if No. 6 were put in force as applicable to *a certain radius of the town*; and this course is recommended for all towns in enforcing No. 6.

A motion was brought forward to change *in "the" public* to *in "a" public* slaughterhouse. This was put forward on the ground that if it was justifiable to forbid local butchers to slaughter in *private* premises not in the town, the same does not hold good as to *public* premises outside the town. This would injure the ever-increasing traffic in killed meat, the carriage of which is so much cheaper than that of live stock—a matter of great importance, especially for East Germany. This view of affairs met with general approval, but the proposer was reminded that it could not be seen how far the traffic with imported meat would be injured by an obligation on the butchers to kill all meat sold in the town in the public slaughterhouse. Moreover, the great drawback was that these outside slaughterhouses might be either public or private. For example, butchers in Saarbrücken, if a slaughterhouse were erected there, would be justified, according to the amendment, in killing in the public slaughterhouse in St. Johann, and thus bring the Saarbrücken slaughterhouse to ruin. Also, it would not cost the town butchers much to turn a slaughtering place in a neighbouring village into the village public slaughterhouse. Altogether, it was made quite clear that by the omission of No. 6 the whole law would lose its meaning, and the amendment was rejected.

Commissioners' Report II.: An amendment was moved that the words "or the sale of fresh meat" should be omitted, as the salesman must be treated from a different point of view to the butcher. The sanitary purposes of the law as regards the salesmen are defined with precision in No. 2. Some of the members agreed with this, and decided that the salesmen were subjected to unnecessary hardships. The Government representatives referred to their first report and remarked thus:

"If sellers of meat were not included along with the butchers in No. 6 the law could be evaded in the easiest and simplest way. A butcher who did not wish to use the town slaughterhouse need only notify himself in the town as no longer a butcher but only a meat salesman, but in the neighbouring village, in which he intended to kill, he would call himself a butcher. In this way, by means of a couple of announcements, he would achieve his purpose without any change in his business, if he still kept his dwelling-house and his shop in the town. If it be averred that the regulations in No. 2 are sufficient protection, it can be shown that No. 2 and No. 6 have quite different ends in view. No. 2 is intended to protect the public from the consumption of unsound

meat, while No. 6 has for its purpose the securing of the stability of the public slaughterhouse, so that the traders in the town will all be compelled to use it."

In opposition to this view it was remarked that if the salesmen were freed from the regulation in No. 6, there would not exist sufficient protection for the butchers of the town. The salesmen would import meat from the surrounding districts, and thus the public slaughterhouse could not be made to pay. The reply to this was that the profits of the slaughterhouse were not the only point to be considered, but that free trade must be kept in view. As examples of existing town establishments being injured by the butchers having meat killed without the town, Düsseldorf and Mülheim were cited.

From Com. Report II. of 1880: On the amendment for altering "in *the* public slaughterhouse" to "in *a* public slaughterhouse," the mover remarked: "The question is not merely the supply of sound meat, but also of cheap meat. It does not therefore matter in what slaughterhouse the inspection is made. Should order No. 6 be adhered to, free trade will be injured, and the cost of inspection will be doubled.

"It is acknowledged that the transport of living animals is considerably more expensive than the carriage of killed meat. The former lose by transport both in quality and weight. The West depends on importations from the East, and this legitimate traffic must not be injured. Also in the case of the outbreak of any animal epidemic, one must be in the position of being able to kill the healthy animals in the slaughterhouse, and convert them into money by transport into other localities. If that cannot be done, the rural economy is injured thereby, and that, in the interest of the national welfare, is not justifiable."

These considerations were weighed by both parties. It was especially pointed out that the constant danger of a visitation of the rinderpest, which is threatened from the East, must sooner or later lead to the necessity of having large slaughterhouses erected on the Eastern boundary, in order that the importation of live animals over the borders may be entirely put a stop to. It is not to be desired that the butcher who agrees to such a proposition as the above should first employ a middleman for the sale of his goods. That would be the case if No. 6 was brought into use, as the Government document recommends. On the other side it is argued:

"In No 6 lies the central point of the whole law. If the amendment is accepted, the laying out of a town slaughterhouse is made illusive, as has been already stated in the report of 24th June, 1880. Town slaughterhouses will be erected on the boundaries of the towns, and thereby a condition of things will arise that is not desired."

The Government representatives referred to their former report as to the amendment, and finally rejected it.

The amendment seeks to meet all the above mentioned objections, by drawing a hard and fast line, by which the orders cited in No. 6 can take effect. It will therefore check the evasion of the law on one hand, and on the other hand the traffic in fresh meat from without will not be stopped. The supplying of the West with fresh meat from the East will never be hindered by this order.

From the Commissioners' report on Manor Houses of 1881: "An addition to No. 6 has been made in the Chamber of Deputies. This No. 6 is the centre point of the whole law, without which the rest would have absolutely no value nor practical importance. It has frequently happened that in towns where public slaughterhouses have been erected the butchers have put up slaughterhouses for themselves beyond the precincts of the town and there killed their meat and brought it unhindered into the town, where they sold it. No. 6 will prevent this evasion of the law.

"The butchers will thus be compelled, if they live in a town which possesses a slaughterhouse, to kill in it. This arrangement is much the cheaper way, otherwise the expenses entailed in the erection of slaughterhouses would in most towns have been in vain. So that no advantage may be taken of this law, it is ordered that all the orders in it must be enforced with the approval of the district council."

The question how wide the circle may be extended was answered by the Government representatives in the report of 1881 thus: "This matter is one of individual consideration. The corporations must determine how wide the district must extend, so that the slaughterhouses which belong to the town may not lie unreasonably beyond it." This will be the common-sense point of view.

From report of 30th November, 1880: "If a corporation find it desirable that fresh meat should be imported into their town they will not accept No. 6 of the law quite in the way stated here. They will not go so far, but will limit the restriction so that the local butchers must only offer for sale meat which they have killed in their own slaughterhouse, a restriction (to wit, the restriction to offer for sale within the jurisdiction of the town meat from cattle killed on one's own account beyond the town) which refers to every other place beyond the town; they will, of course, be restricted to a certain radius beyond the town, and this restriction will be laid

on other butchers, not local. Thus the only danger to the business of the slaughterhouse will be if an opposition establishment is erected immediately on the boundary by the adjoining corporation, while the competition is far less serious than if the importation of meat, perhaps from Berlin or some other distant place, is *restricted* in this way."

It was further pointed out, "The buying of meat which has been sent from Berlin or imported from America will not be forbidden by the law, but undesirable competition will be prevented if individual butchers cannot easily, in opposition to the compulsory slaughterhouse, have a private establishment even in the next town or village, and then offer meat killed there alongside of that from the public slaughterhouse."

From the statement of the Gov. Com. of 1881: "The butcher who practises his calling in a town where compulsory killing is in force is not obliged to withdraw entirely from the sale of imported meat, but he is neither to own nor rent any killing place. A butcher in Berlin, for instance, can get killed meat from the East if he wishes, in spite of the 'compulsory law,' but he must not have it killed there on his own account." The towns are thus directed *not* to issue the prohibition unconditionally as far as No. 6 is concerned, but to draw a line, or rather a circle, beyond which the order in No. 6 does not hold good. Then a native butcher may import meat from a slaughterhouse belonging to him beyond this circle, but within this radius all possibility of evasion will be excluded, so that the salutary arrangements which the introduction of compulsory slaughter is intended to bring in force will not be rendered unavailing.

From Com. Report I., 1880: "In connection with No. 3 of par. 2 it was said that in the discussion at a committee of public health it was considered doubtful whether the orders 2-6 could be of use unless by the introduction of the compulsory law." It was asserted on several sides, and acquiesced in by the Government Commission, that the erection of a public slaughterhouse without the introduction of compulsory killing has not yet occurred, nor is it to be expected in the future, and No. 3 of par. 2 makes it clear and distinct that each order could only be put into force as far as the compulsory slaughter reaches. A supplement to the law in the direction pointed out is therefore unnecessary.

It may be explicitly stated that the corporations will be ordered to put the measures in par. 2 into force, either collectively or separately, and that the corporation orders on the point at the same time can extend just as far as the necessary controlling document issued by the corporation ordains. All the orders mentioned in par. 2 to be issued by the *town* magistrates are subject to the permission of the judges, according to par. 3 of the law.

From the Com. Report of Manor Houses, 1881: It is manifest that owing to the variety of the needs of the different towns, the clauses 1-6 cannot be enforced in every case; but there should be a possibility of choice as necessity requires.

The compulsory slaughter contingent upon the establishment of public slaughterhouses makes such a change in the existing relations of the butchering trade, and has within a short time of experimenting so metamorphosed it, that it appears necessary to submit the above mentioned corporation orders to State permission, rather than to leave the establishing of such institutions to the good pleasure of the corporations. On the respite granted to the owners of private slaughterhouses, which serves to transfer the interests from the existing to the new relations, depends the expiration of the leases, etc., of closed slaughterhouses (pars. 8 and 9) as well as the determination of the compensation payable to the slaughterhouse owners.

From the Com. Report of Manor Houses of 1868: Regarding par. 3, doubts will be advanced as to whether the corporation orders should depend on the permission of the district committee. This permission will be deemed necessary, however, to prevent any possible hardship in these orders, and par. 3 was unanimously accepted.

The "District Committee," for par. 131 of the law on the standing of magistrates, etc. (Aug. 1st, 1883), states: "The district committee can decide—

"1. As to the permission to erect public slaughterhouses to be exclusively used according to corporation orders already prepared (par. 1-4 laws, 18th March, 1868), and the sanction of the contracts between a corporation and an individual regarding the erection of public slaughterhouses.

"2. On the indemnification claims of the owners and tenants of private slaughtering establishments consequent upon the injury done by the erection of public slaughterhouses to be exclusively used."

According to the letter of the law the publication of the corporation orders must follow the erection of the public slaughterhouse, yet the district committees, with one exception (Wesel) have granted permission for publication during the building.

From Com. Rep. of Manor Houses, 1880: The last sentence in par. 3 is for the purpose of preventing anyone from building a new slaughterhouse for the sake of getting indemnification money.

In case of stoppage or decay this paragraph orders that the corporations are held responsible as managers by the Government president. Should they wish to stop, complaint must first be made to the Minister for Trade.

From Com. Rep. of Manor Houses, 1868: The second sentence of par. 5 excited many doubts, as it was considered to be a hardship that as soon as the corporations found it to their interest to let the public slaughterhouse die out, to make this depend on the permission of the district council. However, as everyone would be convinced that the Government, if there were substantial grounds for the abolition of the establishment, would not deny their permission, the proposed omission of sentence 2 was not agreed to, nor was it thought good to change it thus: If the corporation decide to give up the establishment, then the termination of the management depends on the permission of the *Government.*"

From. Com. Rep., 1868: A proposal to enforce the corporation order *re* the abolition of a public slaughterhouse according to the consent of the majority of votes amongst those butchers obliged to kill within its walls, was declined, it being the general view that the interests of these parties were sufficiently protected by the orders in par. 4. It was not held right either to make a matter thoroughly belonging to the general community dependent on the consent of a few butchers.

At the same sitting it was further remarked: "This order (par. 4) will scarcely be practical, because the corporation which has once erected a slaughterhouse will hardly decide to have it closed But if there are exceptional and substantial reasons for the abolition of the establishment the district committee will not stand in the way."

From the orders of 1868: The settling of the table of dues can be left to the judgment of the corporation, so long as they do not overstep the boundaries described in par. 5. Although the latter themselves have a pressing interest in opposing every advance in the price of any necessary article of diet, still the fixing of a maximum charge is necessary to prevent an indirect rise in the price of meat. It lies in the nature of the thing that the corporation must be granted a gradual amortisation of the outlay of capital as well as the cost of upkeep. As soon as the capital is paid up there must be a corresponding reduction of the dues.

From Com. Rep. of Manor Houses, 1868: A proposal to add to par. 5 the following: "Instead of the bare dues remuneration can take place, either partly or wholly in kind, but this was rejected by a great majority, because such payments are never satisfactory.

"In the regulation of compensation claims from the owners of private slaughterhouses, it must be borne in mind that the disadvantages to the business of the former slaughterhouse owner which result from the changed situation of the public slaughterhouses, must at least be weighed against the advantages—the greater conveniences of arrangement, the extended division of labour, the increase in price of slaughterhouse refuse. A compensation claim on these grounds is thus quite inadmissible.

"The circumstance also that the buildings and arrangements for slaughter occupied by private butchers will be divested of their original purpose will be no loss to the owners as a rule, but rather a gain, because by the removal of a business well known to be injurious and detrimental to public health the value of the ground in the locality generally rises at once." Such an advantage accrues either to the owners of a private slaughterhouse or to such tenants who have erected the buildings at their own expense that it would be a matter of economy for the corporations to give compensation money to such owners and tenants as are really losers by their orders.

On compensation dues: It may be doubted if the compensation ordered by par. 7 to be given to the owners and tenants of private slaughterhouses is necessary and judicious. It may be asserted that those in the trade must agree to such a change, seeing it is in the public interest, without claiming any compensation. It has further been advanced that if the corporation lay themselves by law under such obligations the establishing of a public slaughterhouse will be made more difficult. Meanwhile this must be done, as this decision is unfortunately a consequence of a law already in existence (par. 51 of P.O.) Indeed, this law states that the further use of these buildings shall be forbidden in the interest of the public, and the consequence of this law is that owner and tenant must be compensated.

"But these compensation obligations will not be of much influence in retarding the growth of public slaughterhouses. For one thing they are restricted, and are not to be granted for any disturbance or difficulty in the business, but only when the value of ground or buildings is lessened. But this is very seldom the case; on the contrary, the ground and buildings are of more value when used for another purpose, so there will be few claims to be paid."

From the orders of 1880: "The erection of a public slaughterhouse is facilitated by the order that all contracts and leases must be closed at the end of a set time of at least six months, to the exclusion of any indemnification claims by the contracting parties. Private interests are not affected by this order, for without regard to the above-mentioned respite, there is always a space of some years between the beginning of the erection of a public slaughterhouse and its commencing operations, so that the contracting parties have ample time to make new arrangements without either side suffering any loss.

CHAPTER III.

THE ARGUMENTS FOR AND AGAINST COMPULSORY SLAUGHTER IN PUBLIC ABATTOIRS.

The doubts advanced by the opponents of compulsory slaughter,* already referred to in Chapter I., are not only easily confuted, but are also outweighed entirely by the advantages which it brings in its train for the common weal. It should also be noted that the law produces a marked effect for the good of the whole trade, and compulsion is only a seeming hardship, and greatly depends upon whether the butchers have had common slaughterhouses erected by their own initiative or not; thus killing on common ground must not be considered from the point of view of what will be inconvenient and irksome to them, but rather as to the value of the control exercised by an expert over their operations, and therefore Gerlach (*Die Fleischkost des Menschen*, Berlin, 1878) says with truth:

"If they advance various difficulties against the compulsory killing in public slaughterhouses, making special reference to the expense, they are raising objections merely to prevent their business being carried out in the light of the day, proving conclusively the necessity for public control. If the butchers refuse the undeniable advantages and conveniences of a public slaughterhouse, they must be covering sources of gain not legitimately allowable."

The President's remarks to the magistrates of the Government district of Hildesheim, in the year 1888, are particularly applicable to this point:

"The general and well-known objection to the erection of public slaughterhouses on the part of the butchers is readily understood to be due to the vague fear of additional expense causing a reduction in their profits, owing to the necessity of extra transport, as well as the strict control exercised over the quality of each animal brought up for slaughter. An important retarding influence, preventing the

* The reader will understand that wherever the words "compulsory slaughter," or words of similar meaning, appear in the text, they mean compulsory slaughter in a public abattoir.—Eds.

introduction of common slaughterhouses on the part of the magistrates, is not so much their ignorance as to how best to put the idea into execution, as the fear of exorbitant prices being asked for ground for the building and the compensation to be paid to the butchers for giving up the slaughtering places they have occupied, and which they are entitled to claim according to par. 7 of the law of 9th March, 1881. Added to this, then, is the erroneous impression that the butchers have to pay for all these arrangements, together with the influence which these wealthy men can exercise over their fellow-citizens. The butchers are the principal opponents of a common slaughterhouse, and will, if pressed, rather build a guild slaughterhouse for themselves beyond the city boundaries."

Hausburg, in *Der Vieh-und Fleischhandel*, Berlin, says: "These butchers, who are not yet forced by circumstances to this compulsory slaughter, and have not learned by experience that a butcher's business can thrive without a private slaughterhouse, picture compulsion as the ruin of their trade. It must be added that killing in one's own house under the oversight of the master, as well as the cleaning and other operations entailed in the making of sausages, brawn, and such articles, made from the waste of the slaughterhouse under the direction of the butcher's wife, assisted by the other female members of the household, is a great convenience to the butchers, besides being cheaper when all the necessary appliances are to be found in their establishments." Thus private interests again militate against the public interests. If it be true that these private slaughterhouses, built "according to regulations," have most of the faults enumerated in the preamble of the Government Bill, it will be difficult to show that the public weal allows the maintaining of private butchering establishments.

The doubts as to whether the establishments will pay, and not entail an increase in the price of meat, are quite groundless and have long been exploded. That such is not the case has been made *absolutely certain* by the many years' experiences of individual communities. On the contrary, it can be asserted that prices have fallen, because while the quality of meat has improved, the charges have remained the same, without regard to the general rise in the prices of all articles of diet. (See pamphlet by G. Kyarulf, "Is meat dearer because of compulsory killing and inspection? Can public slaughterhouses pay their own way?" Berlin, 1897.)

Still less is there any danger of the establishment not paying, since the orders in the new corporation laws (of 14th July, 1893) have granted great liberty to corporations. The guild cattle and slaughter-yard in Dresden in 1892 had a surplus of 95,947·51 marks, which was distributed as follows: Depreciation on buildings, 3 per cent.; machinery, 13 per cent.; winding and hanging appliances, 10 per cent.; electric light apparatus, 15 per cent.; gas fittings, 12 per cent.; ice appliances and machines, 15 per cent. Besides this, 102,736 marks have been paid as interest on the loan, and 10,800 marks have been paid up as the year's share of the systematic reduction of the loan. The books showed an income of 258,174,555 marks.

At the same time the cattle and slaughter-yard belonging to the guild in Chemnitz showed at the close of the financial year in 1892 an overplus of 6,863,090 marks, 5,488,655 marks of which were written off, while the remaining 1,374,435 marks were added to the capital account. For the paying up of mortgages and for interest 10,004,427 marks were used. The books showed an income of 1,949,300 marks.

In par. 5 of the law concerning the erection of public slaughter-houses (18th March, 1868, and 9th March, 1881), the principles for collecting the dues for slaughter, inspection, the use of weights, stables, cold stores, etc., are laid down, so that they must not exceed the necessary amount required for "the up-keep of the building, the cost of management, the payment of interest, and the gradual amortisation of the capital expenditure, and, lastly, the payment of compensation claims. A higher interest than five per cent. yearly, and a higher amortisation rate than one per cent., along with annual interest saved thereby, need not be reckoned on." The application of any surplus for the benefit of the town exchequer is forbidden, as the dues are to be lowered as soon as a surplus appears.

Par. 11 of the corporation law of 14th July, 1893, decrees that:

"The conditions of the law concerning the collecting of market stall dues (26th April, 1872) remain as before. So also do those respecting the erection of public slaughterhouses (18th March, 1868, and 9th March, 1881). These dues may be levied at such a rate as to cover the costs of up-keep and management, also a return of eight per cent. of the capital outlaid, and the sums paid as compensation. In those towns in which a tax is levied on the consumption of meat,

the dues must only be high enough for the yearly income to cover the costs of the up-keep and the management, to make a return of five per cent. on the capital outlay, and to pay any compensation claims demanded. The dues for the inspection of meat not killed in the public slaughterhouse (par. 2 of the laws of 1868 and 1881) may be in the same proportion as those levied for the use of the slaughterhouse."

By these orders public slaughterhouses become a prosperous business, from which the corporation can draw a profit, although a restricted one. It is explicitly pointed out in par. 14 of the law that the introduction of taxes on the consumption of meat, corn, flour, etc., is forbidden, yet it is not to be denied that a sort of financial burden is in a measure removed from the slaughterhouse by the introduction of a meat tax. To quote further:

"According to par. 5 of the law of 18th March, 1868, the slaughterhouse dues may not exceed the amount required for the upkeep of the buildings, the cost of management, the interest and the gradual repayment of the capital outlay, and the sums paid as compensation.

"The permission to raise the inspection dues mentioned in sec. 3 is necessary in order to establish an equal balance between those tradesmen who, in their calling as butchers, are compelled to use the public slaughterhouse, and those others who because of their purchase of meat imported into the town do not require to use it."

The following point is of special importance: This eight per cent. need not merely be levied, as was proposed in the former laws, up to the time of the complete amortisation, but even afterwards; in fact, as long as the corporation pleases, which will doubtless be as long as the slaughterhouse exists.

Further, this new law, in opposition to the older law (par. 5) of 1868, permits the dues for the inspection of imported meat to exceed the cost of inspection, and this is another blow to the traffic with imported meat.

Although at first many corporations struggled against making a financial concern of their slaughterhouses, still, taking the number of those towns which make use of this new source of income from year to year, we find that it is growing in favour, though many are satisfied with a smaller percentage than the law allows. Generally we find that the imported meat killed *elsewhere* has the heaviest

dues levied on it in proportion to the inspection, although in various towns (Halle, Neustrelitz, Schönsee, Stolp, Küstrin, Werden (Ruhr), and Elbing) the same dues are levied as for the use of the slaughterhouse for killing purposes.

Besides the taxes levied on the grounds and buildings, there is in various places a special tax levied by the town on the slaughterhouses, which is known by the title of the "*contribution to the general cost of management*," and is levied for the purpose of paying various officials who do not belong to the slaughterhouse, but are occasionally required to assist, such as revenue officers, clerks, officers of the board of works, police officials, etc., in some places a stated sum being required, in others a definite percentage of the yearly income being exacted. Although the slaughterhouse is a common institution, it is right that the town should levy this tax, as the slaughterhouse, being self-supporting, should bear its own expenses, and should not claim the services of the officials in other departments of the town without remuneration.

This tax is paid annually in Bromberg (5 per cent. of the yearly income), Bütow 1,000 marks,* Elberfeld (the cattle market and slaughterhouse combined) 5,000 marks, Erfurt 1,200 marks, Gotha 750 marks, Hague 1,800 marks (3·6 per cent. of the income), Halle 250 marks, Insterburg 3,000 marks (7·5 per cent. of the income), Kiel 1,300 marks (1·8 per cent. of the income), Koeslin 1,000 marks (4·5 per cent. of the income), Naumburg 1,200 marks, Ratibor 1,500 marks (5 per cent. of the income), Schönse 100 marks, and Stolp 900 marks (2 per cent. of the income).

The number of towns levying this tax is as yet very small; most of the guild slaughterhouses are exempt from it—such towns as Hanover, Marburg, Bielefeld, and Eisenach conducting business on their own account, although under the supervision of municipal officials.

There have been no objections against the accumulation of a *reserve fund* so far, for it is only reasonable that a small amount of capital should be allowed to accumulate so as to be able to meet the expenses incurred for repairs, rebuilding, etc. Such capital must be invested, and the interest added to the capital, or reckoned as part of the slaughterhouse revenue.

*A mark may be taken as equal to one shilling in English money.—Eds.

ESTIMATING THE PROBABLE INCOME.

It will be advisable to rate the dues high enough, because the income cannot be accurately estimated at the beginning, owing partly to the statements of butchers regarding killing *rarely corresponding with the facts*, and secondly because in each new establishment, though every item be carefully thought out before its opening, there are always contingencies to provide against. Also it must be borne in mind that to the expenses of management must be added at least two to five per cent. on the cost of the building for wear and tear.

A scheme for fixing the dues is to be found at the end of Chapter XI., while two tables added to it give an explanation of the proportion in a number of towns, but this takes place in many towns quite spontaneously without regard to the point in view here. According to the "Inter-state Butchers' Laws," a scheme has been suggested for the towns of Upper Silesia for uniform slaughterhouse dues, but owing to the opposition of several solitary towns it has fallen through. In settling the tariff for the various sorts of animals, their *weight* must be taken into account. For instance, in Lauenburg a duty of 4 marks is paid for an ox or a bull and 1·50 mark for a sheep. If we assume that an animal of the former class supplies when killed on an average about 300 kg. of meat, then there is a duty of 1·33 pf. on each kg. of meat, while supposing a sheep to weigh on an average about 18 kg., then the duty per kg. will be 8·3 pf.! The duties in Eberswalde are in better proportion, because 6 marks (or 2 pf. per kg.) are exacted for a bullock and 0·40 mark (2·2 pf. per kg.) for a sheep. For hogs the dues are proportionately higher, as special appliances (steam, etc.) are required in connection with the slaughter. Besides, they must be inspected for trichinosis, which increases the duties.*

The following table serves as an example: Assuming that there will be killed on the average every year the following animals:

218	bullocks	at	300 kg.	in weight =	65,400 kg.
1,162	cows	at	225 kg.	,, =	261,450 kg.
114	small animals	at	65 kg.	,, =	7,410 kg.
4,746	pigs	at	80 kg.	,, =	379,680 kg.
2,169	calves	at	36 kg.	,, =	78,084 kg.
6,000	sheep	at	18 kg.	,, =	108,000 kg.
					900,024 kg.

* A mark, of 100 pfennige, is equal to about one shilling, eight pfennige (pf.) about 1d., and a kilogramme (kg.) about 2¼ lbs.—EDS.

These 900,024 kg. of meat should as a whole bring in 27,000 marks in dues; if 3 pf. is levied on each kg. of meat the figures for each kind of animal will be:

An ox	= 300 kg.	3 pf.	= 9·00	marks	for	slaughter	dues.
A cow	= 225 kg.	3 pf.	= 6·75	,,	,,	,,	,,
A young beast	= 65 kg.	3 pf.	= 1·95	,,	,,	,,	,,
A pig*	= 80 kg.	3 pf.	= 2·40	,,	,,	,,	,,
A calf	= 36 kg.	3 pf.	= 1·08	,,	,,	,,	,,
A sheep	= 18 kg.	3 pf.	= 0·54	,,	,,	,,	,,

* (+ 0·50 to 1·00 mark for trichinosis inspection).

COMPENSATION CLAIMS.

This question is treated exhaustively in Dr. Sauer's "Entschädigung der Privet-Schlachthäuser," etc., Berlin, 1894, and, as we have already seen, there is no ground for fear as to the charges under this head preventing the common slaughterhouse from paying.

It is more difficult to answer the vexed question of compensation claims. In many cases they have deterred the community from erecting slaughterhouses, because it was feared that the sums asked for compensation would be so high that too great a burden would be laid on the new establishments at the outset. As a fact the law in its original conception gave rise to these doubts, but happily these were entirely removed by the addition of 9th March, 1881.

This compensation obligation appears in the law for the first time in connection with the erection of public slaughterhouses, and no other trade establishments are so affected. The Government has been approached, invariably without result, to cancel this paragraph. It has been, however, well considered, and is not such a hardship as appears at first sight, for par. 7 points out explicitly:

"The owners and tenants of existing private slaughtering establishments within the radius of the town may claim compensation from the corporation for the actual proved injury which they suffer by being deprived of the buildings and appointments serving the purpose of their trade as butchers in consequence of the order in par. 1."

It is hereby fixed, and at the same time also by par. 9 of the same law, *who* must pay these claims, to wit, the *corporation* which erects a public slaughterhouse.

Par. 7 ordains: "In reckoning the injury done, it has especially to be borne in mind that the revenue which can be obtained by another use of the ground and buildings is to be deducted from the actual rental as a slaughterhouse.

"A compensation for any disadvantages which might arise from disturbances in the butchers' trade is not to be entertained."

This resolution, so weighty to corporations, appears for the first time in the amendment to the law of 1881, and defines the tradesmen's compensation claims so distinctly that questionable claims are prevented. It is expressly stated in the law that only the *owners* and *tenants* of private establishments "already in existence" are to have compensation granted them, all those *in the course of being built or projected* being excluded from such compensation.

Still more weighty, but harder still to decide, is the question whether compensation is to be given for injury done to private establishments erected *without* permission. There is already an order in the Prussian Trade Decree of 17th January, 1845, and in the law concerning the erection of business premises of 1st July, 1871, and in par. 16 of the State Trade Orders of 1st January, 1873, that for the erection of butcheries the permission of the ruling magistrates is required according to the land laws. If these butcheries were in existence before the laws of 17th January, 1845, were put into force, and had not been objected to by the inspecting magistrates, the occupiers of such must be granted compensation when a public slaughterhouse is erected, just as all the others were granted concessions *after* 1845; for after contradictory sentences were passed by two Civil Courts of the Supreme Court of the Empire a definite decision was agreed upon by the united Civil Senates of this Court on the 1st June, 1885, to wit: "That *under certain circumstances* compensation can be claimed for private premises erected *without* permission *after* the year 1845, if the owner or tenant proves that all has been done in good faith, that is to say, that according to the circumstances of his case he can show that his private premises exist under proper conditions, although without concession; that moreover no compensation can be claimed if the owner or occupier knows, or ought to know, that he is not justified in using those premises, if he, for instance, conceals their existence from the police, or uses them against an express police prohibition."

There has also been issued a decision of the Supreme Court of the Empire regarding compensation claims for private premises erected *before* the year 1845. (5th November, 1884.)

By this order compensation is only to be granted for *actual proved injuries*, and consequently it is found that compensation claims are in most cases considerably reduced at settlement. A decision of the Supreme Court reads as follows (18th February, 1885):

"In par. 7, the cause of the injury is thus restricted, as the buildings and appointments for slaughter are only deprived of the ends they had served hitherto, but there is no restriction either expressed or indicated in par. 7 or in art. 2 of the law of 9th March, 1881, as to the injury to be met by compensation beyond the actual cause from which it has arisen."

Whether by the passing of this law a limitation of compensation claims has been intended in this direction cannot be made certain: for such an intention is not expressed in the Act, and only the law can decide. In order to do justice to those making claims, and so that the value of the slaughterhouse or room be properly ascertained, it must not be estimated in the abstract in an isolated fashion, but in the concrete, and is not to be considered merely with regard to its situation in the town, its proximity to the market-place, etc., but also in relation to its connection with other parts or rooms of the same business. The Chamber of Deputies says further that "if the claimant is not able to charge a higher rent for the shops and dwelling-places connected with the slaughterhouse, it may be considered a disadvantage which can only be regarded as an *aggravation and disturbance of the trade*, for which, according to par. 7 of the law of 18th March, 1868, no compensation can be given. The decrease of the rents of the rooms let along with the slaughterhouse, in consequence of the prohibition to kill in these premises, is, however, a decrease in the value of property, and is not a disadvantage in the sense of par. 7 of the law, which arises from aggravations or disturbances of the trade."

This decision was agreed to by the members of Civ. Sec. III. of the Supreme Court, 24th April, 1891.

The extent of the compensation is thus limited by the Act (par. 7), "compensation which might be claimed for injuries arising from *disturbances and aggravations of the trade* is not to

be granted," and, accordingly, claims for greater expenses, which arise from the employment of more workmen, the purchase of vehicles, etc., are not to be considered.

The legal considerations which may be raised in determining the injury done to private premises which have been compulsorily closed after the introduction of compulsory slaughter are to be found in the decision of the Supreme Court (IV. C.S.) of 21st January, 1897.

On the other hand, it is certain that butchers' premises in a state of good repair can easily be changed and used for other purposes, for they can either be used by the butchers themselves as rooms for sausage making, fat rendering, pickling, smoking, etc., or built up into dwelling houses, when they will certainly be of more value than hitherto, as it is well known that no one willingly lives near a butcher, where he is subjected to the cries of the animals and other nuisances connected with a slaughterhouse.

Whether it is a bad thing or not, those butcheries erected under police authority will therefore simply be forbidden without any sort of compensation. The law concerning the erection of compulsory public slaughterhouses in the Duchy of Anhalt (20th August, 1878) denies to the tradesman any compensation whatever for private premises.

In some towns an attempt has been made to guard against too great a number of compensation claims by granting concessions to build private slaughterhouses only on the condition that on the completion of the public slaughterhouse the occupiers will renounce all claims for compensation. There will thus be many beginners liable to injury, as they cannot wait until it pleases the corporation to open their slaughterhouse, and therefore build one for themselves, which in a short time becomes almost worthless. A "conditional concession" of this kind was vigorously opposed by the District Committee of Potsdam in these terms :

"The legality of this conditional concession appears doubtful, to say the least of it. The Trades' Law contains a prohibition against *temporary restrictions* being laid only on one class of tradespeople (par. 40). On the other hand, there is no prohibition against permission to build for the purpose of trade. Par. 23, Secs. 2, 51, and 147 makes no mention of the permission for temporary restriction, and consequently a conditional concession, as mentioned, stands in

direct opposition to par. 1. The use of a building for trade purposes is without doubt unlimited by time, and the admissibility of a specific form of concession must be expressly stated in the law. This is not the case. The butcher N.N. therefore, who had renounced all claim to future compensation, did so only because he feared that otherwise he would not obtain permission to erect his establishment, and has accepted an erroneous position. Moreover, so far as the renunciation of claims is made to the town committee, the declaration is not obligatory, because the town committee has to deal with the general management of the land, not to look after the pecuniary interests of the corporations."

In the Opinions of the Commissioners on Farriery in the Kingdom of Saxony, under the section "Guild Slaughterhouses," the following occurs regarding the question of compensation:

"In the consideration of the financial question in connection with the erection of a town slaughterhouse, the compensation to be granted for the discontinuance of private slaughterhouses, according to law, must not be disregarded. If the slaughterhouse is to be erected by the butchers' guild, it is manifestly *not* necessary to grant compensation to the associates of the guild—a circumstance which is strongly pressed by the butchers for their own advantage.

"The losses caused by closing are usually *overrated*, as, of course, those tradesmen possessing a slaughterhouse try to estimate their claims at the highest possible rate; but it is only the *actual* value of the slaughtering places for slaughter that is to be computed, and not the imaginary losses quoted by grasping tradesmen."

Regarding the time for the presentation of compensation claims, which is six months according to par. 3, the judgment of the State Supreme Court is as follows (30th May, 1884):

"The publication of the compulsory slaughter laws, issued six months before compulsory slaughter is put in force, are consequently not inoperative, although a public slaughterhouse *has not been erected*. The erection and fitting up of a public slaughterhouse presupposes the putting in force of the compulsory order.

"On the other hand the actual opening of a public slaughterhouse does *not* presuppose the termination *of the six months allowed for the presentation of compensation claims*. It is, however, much

better that this term should begin on the day of the publication of the orders for compulsory killing, and end six months after, whether the slaughterhouse is finished or not.

"Par. 9, taken along with par. 3 of the law of March 18th, 1868, decrees clearly and distinctly a term of six months to begin with the publication of the Corporation Order. But the law does not distinctly say that this order shall only take effect if at the time of its expiry a public slaughterhouse exists *in a perfectly completed state*. Par. 3 does not have the meaning with which the complainants invest it, that the public slaughterhouse is to be erected by the time of the *publication* of the *decrees;* but at the time of the *putting into force of the prohibition* issued to the *private slaughterhouse keepers*. This set time of six months after the publication of the Corporation Laws is fixed for the *presentation of compensation claims* as well as for the putting in force of the Compulsory Killing Law, but it is made clear that both are to expire at the same time. That does not prevent exceptional cases, in which the one time may expire before the other. If, therefore, the opening of the public slaughterhouse does not take place at the expiry of the settled six months' respite, but follows it (according to January 15th, 1883), this circumstance prevents the prohibition of the use of private slaughterhouses coming into operation until the place is complete, but it does not affect the time within which claims must be made."

As experience has shown, there are in most towns so few claims that can be recognised as justifiable that the sums paid are scarcely of any consequence. In many instances, indeed, the butchers have renounced every claim in order not to increase the capital for outlay unnecessarily, as in Bernburg, Brunswick, Düsseldorf, Erfürt, Hanover, Liegnitz, Munich, Solingen, Zeitz, etc., which were amongst the first to erect slaughterhouses. Even in later days, however, in such towns as Glauchau, Riesa, and Zittau, the butchers have renounced every claim for compensation. Experience hitherto has shown that in no case has more than ten per cent. of the sums claimed been paid.

THE ADVANTAGES OF COMPULSORY SLAUGHTER.

All scruples completely disappear when confronted with the reasons which must move every corporation not to delay in the erection of so important an institution for the public welfare, for :

1. By the strict control exercised in public slaughterhouses,* meat injurious to health is prevented from being offered for sale. All unfit for human food is destroyed, while that meat which comes from animals which are not perfectly healthy and yet not dangerous to the public health may be sold in the slaughterhouse according to the "Declaration of Quality."
2. In the slaughterhouses fitted with all the newest machines and appliances slaughtering is conducted with the greatest cleanliness and with every possible convenience, so that an opportunity is offered to the small tradesmen to kill their necessary supply of meat themselves, with less work than formerly, and without having to rent a slaughterhouse of their own, whereby they gain the confidence of the general public, can more easily compete, and are therefore able to take care that after the erection of the slaughterhouse the price of meat is not raised too much by those with larger businesses.
3. The pollution of air, earth, and water, so dangerous to public health in most of the towns, caused by the careless management of private slaughterhouses, is removed, and this is all the more important when it is pointed out that epidemic diseases develop and spread most quickly in the neighbourhood of public slaughterhouses.

   There is also to be considered the loss to house proprietors who have dwellings to let near private slaughterhouses, as they only command an inferior rent in consequence of their proximity to such insalubrious places.

Regarding the concession of private slaughterhouses, the Minister for Trade and Traffic has recommended the following conditions to be observed as far as possible: Above all it is to be recommended that the area of the site should be of ample dimensions, and that a sufficient supply of water is obtainable for cleaning the rooms and utensils. In particular the following orders are to be obeyed:

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* In the kingdoms of Prussia and Saxony there were killed in the year 1896: *a* Animals killed, *b* proved to be tainted with disease, *c* quite useless.

		Horses.	Oxen.	Calves.	Sheep and goats.	Pigs.
Prussia	*a*	28,162	726,824	1,088,784	1,096,997	3,018,367
	b	41	106,082	1,257	760	58,597
	c	0·7%	0·50%	0·28%	0·11%	0·75%
Saxony	*a*	3,457	85,875	217,990	137,369	424,702
	b	230	29,326	1,932	5,075	22,884
	c	1·30%	0·61%	0·11%	0·16%	0·7%

"The height of the slaughtering room must measure at least 9ft. 9in., and must be sufficiently large to contain, if possible, windows in opposite walls for the admission of a current of air. If air and light reach the room from only one side, there is not sufficient ventilation, and the room must be furnished with one or more ventilators to cause a *current* of air. The walls are to be coated with cement, and painted with light oil colours (*not red*) at least 6ft. 6in. high. The floor is to be water-tight, and must not be boarded. For the waste water, in towns where there is no system of drainage, a cesspit must be made, not too large, but water-tight and thoroughly covered up, and situated close to the slaughtering room, and connected with it by a gutter, into which by a natural fall all the waste water must flow of itself. This pit must be cleaned and *disinfected* in summer after every slaughtering, and in winter twice weekly.

"The solid waste must either be removed at once, after each killing, or be collected in a special water-tight pit, and have milk of lime poured over it until its removal. The slaughterhouse must be so arranged that it cannot be overlooked from the street. Killing in a yard cannot as a rule be permitted.

"In case a supply of clean water is not otherwise ensured, there must be a well on the premises or a water supply in the killing-room. The sewage must on no account flow into public or private water, as it might result in evil consequences for the general public."

As we see, there are still higher demands made on private butcheries than formerly, so that most butchers—particularly the less prosperous of them—must wish to be relieved of the trouble of a slaughterhouse of their own.

4. The torture of animals is quite done away with, as the necessary apparatus and arrangements for stupefaction are at hand (see appendix to Chapter VI.), and the men soon become proficient in handling them, as they have the assistance of competent advisers. This inspection also is very desirable where there are young tradesmen at work, as these are prevented from making mistakes as much as possible, and are taught order and cleanliness. Further, the situation of the slaughterhouse on the outskirts of the town, so that the noise of the animals is only heard by a small circle, is a circumstance not to be underrated.

5. The hindrance and danger to traffic caused by driving animals through the streets are stopped, as delivery can be made at the outlying slaughterhouse without passing through the town, and where there is a railway connection they can be unloaded at the very door of the slaughterhouse itself.
6. By an inspection of the animals while alive, which occurs regularly at every slaughterhouse before killing, the further spreading of infectious diseases amongst animals is prevented, the animals found diseased being killed in a special room, and the disease thus nipped in the bud.

The great value of this inspection of living and slaughtered animals in stopping an epidemic disease amongst animals may be gathered from the fact that in 1896 there were discovered by this means fifty cases of milzbrand (a fatal distemper amongst cattle caused by a disease of the spleen), three of rauschbrand (a kind of madness), seventeen of glanders, eleven of epidemic lung disease, one of a rash of blisters or spots, twenty-two of sheep mange, beside numerous cases of foot and mouth disease.

7. Cattle-breeding is made a more profitable occupation, as the breeders are given the opportunity of assuring themselves of the state of their animals' health after slaughter, and are able to give up the breeding of animals unsuitable for the purpose. On the other hand, it is of no little importance to them that contagious microbes passed from animal to animal are removed after slaughter by the destruction of the affected organs.

The favourable effect of meat inspection in Berlin has been discussed by the noted oculist, Prof. Dr. Julius Hirshberg, in his "Report of Twenty-five Years' Work" in his institution for the curing of diseases of the eye—on the frequency of a certain disease of the eye in Berlin before and after meat inspection was put into force. This book appeared in 1895. In 1876 there were five cases of "augensinne" (the disease in question), four in 1877, and in the four years 1886-9 there were amongst the 30,000 patients that passed under his hands only one case of "augensinne." In the nine years since meat inspection has been in operation there have been amongst 73,000 patients with diseases of the eye only three cases of "augensinne" (two of whom came from abroad). Before meat inspection was n

operation there were, amongst 60,000 patients, seventy cases of "augensinne." He closes his remarks with the hint that this diminution of the number of cases in Berlin shows that, by observing certain rules, an important disease can be almost completely guarded against.

8. The quality of the meat becomes better as soon as the butchers begin to outbid each other in the purchase of the better goods in the public slaughterhouse; the inferior meat will be sold as such at the Freibank, while the duty on both will be the same. The control of the butchers on each other is not to be underrated.
9. By the building of a cooling chamber alongside of the slaughterhouse a number of advantages are secured to both the butchers and the public, which will be gone into thoroughly in the chapter on the subject.
10. By the addition of a cattleyard to the slaughterhouse even the smaller tradesmen will have the opportunity given them of buying animals at suitable prices and leaving them there if they like, without dealing with jobbers, and so increasing their expenses.
11. Science is advanced, for by the collection of pathological and microscopic preparations younger experts get the opportunity of increasing their knowledge; at the same time novices can here fit themselves as specialists (trichinosis inspectors and meat inspectors), as material for study is offered in great abundance.
12. The necessary materials for the cure of animal diseases are to be found in the public slaughterhouses in the shape of baths for the destruction of animalculæ, etc.

How little these great advantages were appreciated until a few years ago is shown by the fact that in 1874, six years after the passing of the law of 1868, only two towns in Prussia (Solingen and Liegnitz) had erected slaughterhouses, while in Cologne and in Düsseldorf their building had been decided upon, and after six more years (in 1880) there were only eleven towns (besides the four already mentioned), Bochum, Elberfeld, Glatz, Hersfeld, Mülheim, Reichenbach, and St. Johann, which possessed establishments of the kind. At the present time there are in Germany about 713 places with compulsory slaughter, of which 359 are in Prussia alone. In

spite of this considerable number, there are in the German Empire about 725 places (445 of which are in Prussia) with more than 3,000 inhabitants which still possess no public slaughterhouse (100 of these towns containing 10,000 inhabitants). In about fifty of these towns slaughterhouses are in the course of erection, and in perhaps about as many they are being planned.

It is of pressing necessity that compulsory killing and meat inspection should become general, for thus only is it possible to get an equal influx of cattle from all quarters, while the fear of loss keeps many producers from bringing their cattle to be sold in places where compulsory killing is in force, especially if slaughterhouse cattle insurance societies guard them against the loss of their property.

By the Royal Decree of April 2nd, 1800, "on the prevention of cattle epidemics and other infectious diseases of animals," a kind of meat inspection was even then exercised, for par. 7 says: "Every individual ox, etc., must be inspected before killing by a parish overseer or *herdsman*, and can only be allowed to be killed if there is not visible any mark of disease." Par. 8 runs: "That all butchers must undergo an examination on the marks and signs of animal epidemics by the medical expert of the town or district before he becomes a master butcher."

Obligatory meat inspection is already in existence in the province of Hesse-Nassau, in Oppeln, and Potsdam, in the larger cities in the province of West Prussia, and is under consideration in Liegnitz. Thus it is to be hoped that in a short time it will be obligatory *all over* Prussia, for according to an intimation of the Imperial Court of Chancery on the 27th July, 1898, an order backed by *imperial law* was promulgated, which included the regulation of the inspection of meat, hygienic rules concerning the importation of meat from *foreign* countries, compulsory slaughterhouse cattle insurance, and the valuation of confiscated goods.

If the erection of a slaughterhouse appears too expensive for some small individual towns, several adjoining corporations or parishes can unite and erect a common slaughterhouse amongst them. Such are to be found in several thickly populated districts of Prussia, principally in industrial centres. According to a law (27th

February, 1896), a parish can order the use of a slaughterhouse not within its boundaries, and it is to be hoped that many more places will take advantage of this liberty.

According to Bollinger, "Every town management which could erect a slaughterhouse to meet the requirements of the place is at this present time guilty of hygienic neglect of the worst kind if it omits to do so."

CHAPTER IV.

BY WHOM SHALL THE SLAUGHTERHOUSE BE BUILT?

According to par. 1 of the laws of 1868 and 1881, every corporation or parish is free first of all to build a public slaughterhouse, and should it cede its right to a third person, a guild, a limited company, or a private individual, it is obliged to undertake the control of the institution.

Private parties or tenants are very rarely in possession of such establishments; a greater number belong to guilds, and these will now be discussed.

GUILD SLAUGHTER-YARDS.

In general we have been able to obtain but little information on the building of slaughterhouses in olden times.

When, at the beginning of the twelfth century, these guilds were formed for the mutual attainment of the common good, small sums were gradually amassed, partly by legacies and partly by contributions, which were used in the common interests of the guilds, in the building of guild houses, etc. Nowhere do we find in the chronicles of the time that slaughterhouses were built by one of these guilds, as they appear to have been erected by the magistrates outside the gates of the towns.

That in isolated towns rich guilds had common slaughtering-places built for themselves cannot be gainsaid, especially as at that time "company killing" was much in favour. By this was understood the apportioning of one animal to several butchers. Under the Augsberg town laws it was only allowable "that only two could join to buy one ox." Many of these establishments were ruined in the course of years, partly through decay, partly on account of their position—exposed outside the gates of the town—they were devastated in the countless wars of the time.

Of those erected in the sixteenth and seventeenth centuries, it is known that many belonged to the guilds; for instance, those in Breslau, Königsberg, Strassburg, Zwickau, and other towns, some of which are still in existence.

With regard to the law of 18th March, 1868, concerning the erection of obligatory public slaughterhouses, according to which it is left to the corporations or parishes to erect a public slaughterhouse themselves, or to cede their right to private parties, companies, etc., it was said "that it might be better to leave the erection and arrangement of public slaughterhouses to the spontaneity of the members of the trade, and only to make the corporation obliged to grant an advance of the whole sum necessary for building, or a part of the sum to be paid back gradually by amortisation, as has been done in other States—Würtemberg, for example." Against this it was urged as follows:

"As the erection of public slaughterhouses affects the sanitary and police interests, the control should be committed to the magistrates of a community rather than to private parties. Further, on the principle that public slaughterhouses shall be treated as municipal concerns, it can be reckoned with greater certainty that slaughterhouses will be found where they are required, and, finally, by treating this as a municipal matter a greater guarantee will be offered for its stability and stricter attention to all its future requirements. Still, the law in no way excludes the erection of public slaughterhouses by private individuals or by companies of butchers. If, then, the united butchers of a town are ready to erect a public slaughterhouse, and if they can offer the necessary guarantee for its judicious management, *they are at liberty to do so.*"

In fact amongst the 713 public slaughterhouses in Germany, there are only sixty-five belonging to guilds or private parties. Some of them are in the larger cities, such as Dresden, Chemnitz, Stuttgart, Hanover, etc. The guild slaughterhouse of Hanover is to be taken over by the corporation of the town in 1909, in consequence of a lawsuit, and in Stuttgart and Dresden also there are negotiations of a similar nature in progress. Most of these guild slaughterhouses are to be found in Saxony, where there are only seven belonging to the community. As there is no other institution so much devoted to the furthering of public good and the interests of

public health as a public slaughterhouse, it should be the duty of every community to erect such a building for itself, fit to provide the inhabitants of the place with as cheap, good, and sound meat as it is possible to procure. Such an establishment will cost the community nothing, but according to the new Corporation Laws increase its income. Should the corporation decline to undertake the erection, it is even then not allowed to escape the obligation of controlling it. In a report of a Commission on Veterinary Matters in the Kingdom of Saxony of 29th April, 1893, concerning the erection of public slaughterhouses, it is stated that when in the hands of guilds and private parties grave faults and deficiencies have been observed, which injured the value and use of such establishments.

The following points in this very exhaustive report are worth producing :

" A slaughterhouse must not only meet every hygienic requirement, but every appliance must be used in the most practical and thorough manner, and must always be in good condition. In the former respect there is no important difference between municipal and guild slaughterhouses, but in the latter the magistrates take pains to have their establishments as perfect as possible, even although there are grounds for economy.

" In the latter respect the greatest cleanliness must be exacted in every part of the establishment, not only in the killing-house, the cool-room, the stables, and in the yards ; but also in the washing of the tripe, etc., and attention to the receptacles for refuse and manure. A neglect of these requirements will result in the production of bad smells and the breeding of disease-promoting germs, which find in the concentrated organic combination of slaughterhouse refuse exceptionally favourable breeding-grounds for their development and increase. On this question of cleanliness, however, the critics are much divided. Those engaged in trades which are constantly producing dirt are, in practice, less sensitive on this point. Such is the case with butchers and similar people ; consequently in a guild slaughterhouse there is not, as a rule, such a high degree of cleanliness maintained as in municipal establishments, although in the long run there is a saving of work, time, and material if absolute cleanliness is aimed at throughout.

"In municipal establishments these requirements are easily attained. Officials appointed by the corporations usually supervise the arrangements much more closely, and take pains to discover and remove every defect. There will be especial attention given to each individual hygienic arrangement, the keeping in order of waste pipes so that all impurities are carried off, the preserving of the floors in a water-tight condition, and the frequent and careful removal of refuse and manure. Improvements and repairs will be carried out better and much more quickly than by guild officials, who are often obliged for financial reasons to preserve too strict an economy. Still more unfavourable are the conditions respecting the *position of inspecting veterinary surgeon* in a guild slaughterhouse. For as this medical officer must, in carrying out his multifarious duties, give decisions which are unpleasant to the butchers as a whole or individually, his position may be made extremely difficult by active and passive opposition, especially as the butchers have his existence in a measure in their own power. The impartiality of meat inspectors often suffers under such circumstances, and throws doubt on the certainty of his decisions, which should be made not only in the interests of the butchers, but also in those of cattle breeders and dealers, and above all of the consumers. He must be made as independent as possible; for butchers in most cases are entirely *ignorant* of the conditions of disease in animals, and look upon each condemnation as an injury to their personal property. It is, therefore, clear that most of the butchers will prefer a lax veterinary control to an examination conducted on the strict principles of meat inspection. An expert in such circumstances dare hardly appeal for municipal sympathy when the butchers have the upper hand in the town.

"Medical officers have often hazarded their positions, and may have been eventually compelled to resign, because they were neither supported nor understood by the magistrates. Such a state of things should be impossible, as the slaughterhouse, with its meat inspection, is intended for the welfare of the public. It is thus the duty of every town council to make the slaughterhouse officials independent of the interests of a minority. The best way to attain this end, where there are guild slaughterhouses, is to order that the veterinary officials be appointed by the town council, and the other officials of the slaughterhouse by the guild. But even when

this precaution is taken it often happens that the orders of the medical officers are not carried out by the other officials."

There are different "decrees" in existence regarding this matter. The Commissioner on Veterinary Matters in the Kingdom of Saxony, as far back as 1860, expresses the opinion "that scientific meat inspection can only be exercised when the inspector can represent the interests of the consumers, and is entirely independent of the butchers, that, moreover, if the inspector is at all dependent on the butchers, whose interests are often opposed to those of meat inspection, his judgments are often milder and easier than appear desirable to the consumers.

"The doubts advanced in a petition of a butchers' guild of M., that the slaughterhouse medical officer, if appointed independently of the butchers, would undermine the position of the butchers, is hardly probable, while, on the other hand, it is open for the consumers to advance that the medical officer appointed by, and dependent on, the guild would not dare to oppose the interests of the butchers, if he wished to keep his position as their official."

Conflicts of this kind are continually dreaded, and have in different towns resulted in the appointment of the medical officers being taken from the butchers' guilds.

The President of the Government of Breslau (16th March, 1892) in giving a decision said: "It appears not only pressingly desirable to aim at a regulation of the appointment of the medical officers in local slaughterhouses, so that these are not merely dependent on the users of these local slaughterhouses, but it is *necessary*, *in the interests of the police*, to see that these appointments are completely independent of the slaughterhouse users, and are entirely in the hands of the magistrates of the town of Münsterberg. The magistrates of this town are therefore ordered to appoint these medical officers without further question, although the local slaughterhouse belongs to a private proprietor, because, according to par. 12 of the laws concerning the erection of compulsory public slaughterhouses of 18th March, 1868, and 9th March, 1881, this is to be regarded as a public arrangement for the community.

"This medical officer is to be paid out of the funds of the exchequer, for which the town, by the order of par. 5, makes a contract with the occupiers of the slaughterhouses to participate in the costs of the slaughterhouse. In a contract of this kind it must

be made clear that the efficiency of the medical officer be tested, that he must examine the animals both when alive and after slaughter, and that he has the whole control of the building, and even over the slaughterhouse master."

It may at first sight appear an advantage for the managements of smaller towns who are often overwhelmed with work, and have only a limited number of officials, to give up the management of a slaughterhouse into the hands of a guild, and so relieve themselves of a burden ; but this advantage is only apparent, for even guild slaughterhouses are continually claiming the attention of the magistrates.

Even in the designing, building, and fitting up of slaughterhouses magisterial control must be exercised by frequent consultations and inspections. Further, the elaboration of town laws and regulations for the use of the slaughterhouses, for meat inspection, market and animal insurance, would claim much time. There is so much work to be done in any case that it means very little more to have the building entirely under the town control than for it to be in the hands of a guild requiring the making and enforcing of decrees. After the building is opened, a continual magisterial control in all its branches is thoroughly necessary. This control can perhaps be undertaken by individual municipal officials along with their former duties, but in every case there is laid on these officials heavier burdens, occasioned by the continual written and oral negotiations between them and the guild. Thus certain difficulties cannot be avoided, for, in settling damages, in making alterations and additions, in procuring and appointing officials, etc., the orders of the corporation are not sufficient, they must first be accepted as satisfactory by the representatives of the guilds, agreed upon, and then finally brought into operation.

All possibility of misunderstanding, differences in aim, and disagreements, will be simplified if the slaughterhouse is municipal property. The small number of officials required in a small slaughterhouse will be placed under the head of the establishment, and if he is invested with absolute control of its administration, he can manage the whole business without difficulty and without trouble to any other branch of the municipality. This leading official *can communicate all his suggestions for alteration, improve-*

ments, etc., directly to his fellow-councillors, and can thus discharge all his duties without difficulty.

Lastly, the financial considerations are most important.

As soon as a public slaughterhouse is proposed the most interested tradesmen, the butchers, at once make a determined stand against it, out of fear of the *supposed* inconveniences in connection with compulsory killing in public slaughterhouses, by which they consider their calling is threatened, as well as on account of the *strict control over their business*, which a public slaughterhouse necessarily entails.

The cost of the undertaking is brought prominently forward, and the butchers predict a rise in the price of meat—a consideration which readily appeals to the public and the municipality.

If all the objections raised by the butchers do not influence public opinion, and especially if the leading men of the town are determined to erect a public slaughterhouse, then the butchers almost always suddenly give up their opposition and acknowledge the necessity for a slaughterhouse, demanding, at the same time, the right to build, fit up, and manage it.

Without regard to other reasons not discussed here, the question of finance is put in the foreground by the butchers. They try to touch the citizens in their weakest spot, and the not inconsiderable costs of building, fitting up, and managing are made out to be unduly high, and likely to be a strong burden on the shoulders of the ratepayers.

As has been already urged, according to the new "Corporation Law" (par. 11), in opposition to the earlier laws of 1868 and 1881, the town councils are subject to no risks, but draw a good income by retaining some interest (up to eight per cent.) for the town purse. If, now, these new orders are in opposition to the slaughterhouse law—for no profit should be made in an establishment for the public weal—yet it is much better that the town should have what advantages there are rather than individuals or companies of only *one* calling. That the advantages are not to be despised we have gathered from the reports which were given by the guild slaughterhouses of Dresden and Chemnitz with regard to the costs of such establishments, where the important surplus does not, as in a municipal institution, enrich the ratepayers, but only a few individuals.

In both these guild slaughterhouses the dues for cattle brought to the cattleyard for sale, for slaughter, weighing, etc., are not at all high, while for the members of the guild they are extremely low. In the latter case the members of the guild have a direct pecuniary advantage, which in a certain measure may be considered a gain to the individual members. That these unusually favourable conditions under which the butchers work in most of the guild slaughterhouses are not likely to *result in a lowering of the price of meat, and be thus advantageous to the rest of the townspeople, must be evident.* A guild slaughterhouse, therefore, is of a direct pecuniary value only to a very limited number of townspeople; only, in fact, to the members of the guild, who as time goes on will grant further favours to each other, which the generality of the townspeople will not participate in.

What is true of the guild slaughterhouses, where the butchers are members and beneficiaries, is doubly so in the case of a private individual who erects a slaughterhouse, either on his own account, or as the representative of a company. In this case the institution serves as a lucrative source of gain, and will require strict control. It is quite otherwise if the slaughterhouse belongs to the town. Then, as has been already stated, the capital invested will be repaid, and the town will be in time the owner of a valuable possession, the acquisition and retaining of which have in a measure cost it nothing, because of the manner in which the capital outlay is paid off. The results in a progressing, well-conducted business like a municipal slaughterhouse are so favourable that, after the deduction of the interest and the repayment of capital, a large surplus still remains, and the dues may be reduced to the tradesmen using the establishment, as is done in the guild slaughterhouses. If a rise in the price of meat is not to be expected in any place, and if this fact becomes known to the citizens, it will be recognised by all that the pecuniary interests of the townspeople will be guarded before favours are granted to one solitary class of tradesmen."

It is undoubtedly objectionable to allow a limited company or a private individual to erect and manage a public slaughterhouse. Happily, institutions in such hands are in the minority, and are gradually disappearing. What consideration can they

have for the sanitary interests of the community? Their chief aim is to make as much money out of the establishment as they can. Consequently they try to raise the price of meat, and the inhabitants become losers. The butchers themselves are hardly wise in struggling so determinedly against the erection of municipal slaughterhouses, and then demanding guild establishments. They are not even then undisputed masters of their own territory, for the town councils stand over them.

In Rosswein an experiment has been made to strike a middle course between a slaughterhouse under municipal authority and one in the possession of and managed by a butchers' guild. The management is now only under the control of the town council, who appoint all officers, determine salaries, and issue all orders. The slaughterhouse is for the use of everyone, but members of the guild get twenty-five per cent. discount in paying the dues. If the guild do not hold to the obligations of their contract the town is to take possession of the institution and all its fittings, and to undertake to pay up the balance of the capital. According to the new law the corporations must make certain that rather a high percentage will be paid on the capital borrowed for the outlay, so that a considerable burden is laid on the occupiers of private slaughterhouses. If the establishment is municipal, compulsory slaughter can be extended to private slaughterhouses, whereby it is substantially supported, and a not inconsiderable income accrues to the slaughterhouse purse, which will again be of advantage to the body of butchers.

It must be expressly emphasised here that *all* the guild slaughterhouses are *not* badly managed; on the contrary, there are a number of such establishments which rightly earn the title of pattern establishments; it is mainly those in private hands and a number of the smaller guild slaughterhouses which are in a most unsatisfactory condition.

Every corporation, however, is earnestly advised to build a public slaughterhouse for itself; for "it is not necessary to give further proof that undertakings for the welfare of the public are most effective when they are conducted by magistrates who treat them according to the object in view, and not as a department of a private business" (*Ostertag*).

CHAPTER V.

GENERAL REMARKS ON THE SITUATION OF A SLAUGHTERHOUSE.

If a community resolves to build a slaughterhouse, a special commission is usually appointed, which consists of a magistrate, an architect, a veterinary surgeon, and a butcher. This commission inspects slaughterhouses in other towns of the same size, obtains the plans of the slaughterhouses visited, and then makes its report to the municipal bodies. Thereupon the building programme can be laid down.

INSTRUCTIONS CONCERNING SLAUGHTERHOUSE BUILDING ISSUED BY THE DISTRICT VETERINARY OFFICER IN SAXONY

We should like to quote the instructions given by the above medical officer for the general primary conditions of a building destined to be a slaughterhouse.

"The following points must be kept in view in the planning of a slaughterhouse to satisfy the requirements of sanitary officers and to ensure a thorough inspection of the meat :

"*Site and Matters connected therewith.*—The slaughterhouse shall lie on the outskirts of the town, in as isolated a spot as is possible, in order to be able to form a sufficient barrier in case of infectious disease, so as not to endanger the condition of animals on other premises. The roads leading to it must allow of cattle being conveyed along them without endangering the traffic to the town beyond. Where the importation of cattle from the surrounding district is not sufficient for the needs of the slaughterhouse, a direct connection with the railway should be demanded as soon as the importation of foreign cattle is thought of. The unloading platform must be sufficiently large and so arranged as to be watertight and easily disinfected. If it is intended that the waggons are to be disinfected in the neighbourhood of the slaughterhouse, the siding for this purpose must be cemented and fitted with arrangements for carrying off the waste water.

"*Lairage Appointments.*—The animals must have rest before slaughter. It is only after a lengthened rest of the body that they furnish normal and sound meat. Fatiguing muscular exercise impoverishes the meat and the blood. 'The meat loses in value by muscular exercise (transport).'—Gerlach. The stalls should not be too large, so as to limit the spread of an infectious disease and to make disinfection easier. For the latter purposes it is important that the flooring should be watertight and also the walls to the height of the animals. The fitting up of a lairage for doubtful cattle cannot be allowed in any part of the country on account of the danger of spreading infectious disease which might result from such a practice. Where the importation of foreign cattle is intended, it is well to have special stalls for these animals (both large and small) situated quite apart from the other stalls, and to have a special unloading platform for them so that they may not come in contact with the home animals at all.

"*Killing Rooms.*—To avoid irritating the animals the floor must not be too smooth. For the purposes of meat inspection there must also be sufficient light. To prevent single organs being stolen this room must be isolated and be provided with a lock. It is necessary to have for the trichinosis inspection a large well lighted room, if possible lighted from the north, and not overshadowed by other buildings.

"There must be an office for the meat inspector, so that he can conduct his correspondence and perform his various duties properly.

"There must be a hospital stall and a police slaughter-room for the reception and slaughter of diseased animals, both to be separated from the other stalls and slaughter-rooms, and be easily disinfected.

"The manure heaps must be so arranged as to admit of being easily cleaned, and not to endanger the condition of the animals by breeding material for infection.

"There may be rooms and apparatus for the destruction of horses and dogs, if the compulsory killing of these has been ordered, but they must have special entrances, and traffic between these and the slaughterhouse must only be permitted to inspectors.

"If it is intended to have a cattleyard adjoining the slaughterhouse, from whence it is expected much will be exported, the cattleyards, feeding-stalls, and market-place must be as distant as possible

from the actual slaughterhouse and as near as possible to the railway track."

Similar instructions are to be found given in 1883 by K.K. Chief Sanitary Councillor concerning the regulation of cattle and meat inspection in Austria. In this he says, amongst other things:

"Slaughterhouses must in general fulfil the following conditions:

"1. The slaughterhouses are to be erected on such places as to cause the neighbourhood neither sanitary dangers nor annoyance, and they must not adjoin the principal places of business.

"2. Large slaughterhouses situated in a kind of railway yard should have special tracks leading right into the buildings.

"3. In the erection of new slaughterhouses it is best to choose the common hall system, as that makes it possible to have the slaughter well watched, and the place is most easily kept clean.

"4. The inner walls of all the rooms of a slaughterhouse, as well as the stalls, should be, for at least two metres high, perfectly smooth, watertight, and easily cleaned.

"5. All rooms in the slaughterhouse must be well lighted and ventilated.

"6. In the choice of the necessary fittings wood is to be avoided, if possible.

"7. The flooring of all the rooms and stalls must be of watertight material, and must be built on a slope so that all the moisture may run off quickly and thoroughly. For leading off the drainage open gutters are the most suitable. The necessary channels, the manure heaps, and the waste-pit must be watertight, and must be kept in such a condition that not a single impurity pollutes the air.

"8. In the fitting-up of a slaughterhouse care is to be taken that there is a plentiful supply of water in coneection with it.

"9. The removal of waste must be effected in hermetically sealed waggons.

"10. There must be careful sanitary arrangements for the drainage of the slaughterhouse.

"11. For the preparation of the scraps (skin washing, fat melting, etc.) there must be a special room, quite apart from the slaughter-room and cooling rooms (hanging rooms).

"12. There should be digestors in every slaughterhouse, in which the various condemned parts may be destroyed harmlessly."

THE SITE FOR A SLAUGHTERHOUSE.

The following points must be observed: It must not be too far from the town, in the interests of the butchers, especially of the poorer amongst them who have no carts or vans. It is surprising how little regard is paid to this in many towns. There are some small towns—in large towns it is often unavoidable, because of the difficulty in obtaining suitable ground—from which the slaughterhouses are twenty minutes and even further from the centre of the town. In larger towns it is not so important, as the meat can be brought home to the small butchers in transport waggons belonging to the corporation. Further, the site must be located so that private houses cannot be built near it, and so that the buildings may be enlarged without difficulty.

The form most suitable is a right angle, or, better still, a quadrangular building, with the entrance on the principal road, and if possible there should be a piece of ground attached to it at one of the other three sides, which can easily be connected with the railway, and which will later be suitable for a cattleyard.

Osthoff states the following as a fair size:

For towns of from	5,000	to	7,000	inhab.	4	sq. ft.	to each inhab.
,,	,,		7,000	,, 10,000	,,	$3\frac{1}{2}$	,, ,,
,,	,,		10,000	,, 50,000	,,	3	,, ,,
,,	over		10,000	,, 50,000	,,	$2\frac{1}{2}$	,, ,,

Other instructions as to the foundations of slaughterhouses and cattleyards are found in the chapter dealing with cattleyards.

Further, there must be good roads for bringing in the cattle.

In towns which are situated on rivers it is advisable to erect the establishment below the town, so that the drains may fall direct into the stream, without passing the town.

THE DIRECTION OF THE WIND.

Weight must be laid on the predominating direction of the wind, to prevent bad smells as far as possible. A judiciously-appointed and well-managed slaughterhouse should have no odour, but every possibility of annoyance to the neighbourhood must be absolutely avoided. When it is proposed to build such an establishment those

dwellings nearest often raise questions as to this. Others will inquire if it is intended to add a department for melting fat or an albumen-factory, and if care will be taken to carry away injurious vapours (by leading them into the boiler-furnace).

THE WATER SUPPLY.

The question of water is of paramount importance to the institution, the more so if the town to which it belongs has no water supply mains; for as the most scrupulous cleanliness and the use of much water are necessary in every slaughterhouse, the supply of water must be taken into account in the choice of a site, not only as to quantity but the quality, care being taken that it contains no chemical constituents unfavourable to cooking operations.

THE VARIOUS BUILDINGS.

The buildings necessary for every slaughterhouse establishment are:

1. An administrative block.
2. A slaughtering place (with a special scalding-room for pigs).
3. Stalls or pens.
4. A room for the cleaning and scalding of the inner portions of the animals (manure-house, tripe-house, etc.)
5. A boiler and engine-house.
6. A special killing room, and hospital stall for diseased or suspected beasts.

These rooms are *absolutely necessary;* but in small towns (up to 15,000 inhabitants) two or four of these may be under one roof to save expense in outlay. Of course, the cost of the building rises with the number of people it has to supply, and while in moderately sized towns there must be a killing place for cattle and one for pigs, in large towns there will have to be a special apartment for every variety of animal.

On the next page a table prepared by Osthoff is given, showing the proportion of animals killed to the population of a town. The slaughter-rooms or slaughterhouse proper—the whole building should be called a slaughteryard to prevent confusion of terms—can be built on two different systems, the French or the German. The first, which we find with a few exceptions (Berlin, Vienna, Pesth, Edinburgh, Basle, etc.) only in Roman countries, is built on the principle of providing each butcher

COMPARATIVE STATEMENT SHOWING THE ACTUAL NUMBER OF ANIMALS SLAUGHTERED PER HEAD OF POPULATION.

Inhabitants of the Town.	OXEN.			YOUNG ANIMALS.			PIGS.		
	Annual Slaughter.	Average Daily Slaughter.	Largest Daily Slaughter.	Annual Slaughter.	Average Daily Slaughter.	Largest Daily Slaughter	Annual Slaughter.	Average Daily Slaughter.	Largest Daily Slaughter.
5,000	600	2·0	4	1,800	6·0	12	900	3·0	9
6,000	720	2·4	5	2,160	7·2	15	1,080	3·6	11
7,000	840	2·8	6	2,520	8·4	17	1,260	4·2	13
8,000	960	3·2	7	2,880	9·6	20	1,440	4·8	15
9,000	1,080	3·6	8	3,240	10·8	22	1,620	5·4	17
10,000	1,200	4·0	8	3,600	12·0	24	1,800	6·0	18
12,000	1,440	4·8	10	4,320	14·4	29	2,160	7·2	22
15,000	1,800	6·0	12	5,400	18·0	36	2,700	9·0	27
18,000	2,160	7·2	15	6,480	21·6	44	3,240	10·8	33
20,000	2,400	8·0	16	7,200	24·0	48	3,600	12·0	36
25,000	3,000	10·0	20	9,000	30·0	60	4,500	15·0	45
30,000	3,600	12·0	24	10,800	36·0	72	5,400	18·0	54
35,000	4,200	14·0	28	12,600	42·0	84	6,300	21·0	63
40,000	4,800	16·0	32	14,400	48·0	96	7,200	24·0	72
45,000	5,400	18·0	36	16,200	54·0	108	8,100	27·0	81
50,000	6,000	20·0	40	18,000	60·0	120	9,000	30·0	90

with a room for himself in which to kill. These little rooms lie on each side of a central passage, which has a door at each end. Every small room has a door into this passage and another leading directly outside into the road by which the cattle are driven into the building.

The characteristic of the French system is that every building is isolated, and is surrounded by an open space. In Hamburg the cattle slaughterhouses are divided by movable partitions into single places, each provided with an entrance from outside, and each open to the central hall.

In large towns, where butchers are divided into butchers proper and salesmen, the French system does very well. But at the present day the old German system, which is adopted by all corporations, and in which the slaughterhouses are connected with the rest of the buildings, is preferred almost without exception. The French system is not at all practicable for small towns, being so much

more expensive, and it has besides the disadvantage that the control over slaughter is rendered more difficult thereby, while in a common room the butchers act as a guard on each other. In the next chapter only the German system is discussed, which, as we have seen above, has been recommended by the Austrian Commission, although in various large towns of Austria the French system has been adopted.

The situation of the various buildings should be selected so that the administrative block (containing the manager's house) is at the entrance, and commanding a view of the whole hall. In close proximity there should be a weighing machine for cattle. The middle of the hall should contain the two to four rooms described a few pages back, or in larger establishments the slaughterhouse proper may be here, and opposite it, separated by a road, the stalls. The manure-house and tripe room must be conveniently reached from all parts of the building, which can easily be done if these rooms are directly connected with each other; still it is this arrangement of the direct connection of slaughterhouse and stalls, etc., which often causes the worst fault met with at the present day, due to bad smells, vapours, and steam, entering the slaughterhouse and damaging the meat.

In the near neighbourhood to the tripe room and the pork scalding room should lie the boiler and engine-house.

The police slaughterhouse and stalls for diseased cattle should be isolated from all the other buildings.

The buildings must be arranged not merely for the actual number of inhabitants in the town but with a view to their increase, so that if this actually happens extensions may easily be made.

The following "principles for the erection of public slaughter-houses" were given for the Gov. Dis. of Bromberg (29th Nov., 1896):

Area of the Ground.—This must be at least $6\frac{1}{2}$ sq. ft. per inhabitant for 3,000 inhabitant; $5\frac{1}{2}$ per inhabitant for 3,000 to 5,000 inhabitants; $4\frac{1}{2}$ per inhabitant for towns of from 5,000 to 7,000 inhabitants; 4 per inhabitant for towns of 7,000 inhabitants or more.

Buildings.—Each slaughter-yard must contain:

(*a*) Slaughter-rooms, in which the animals are killed, hung, skinned, and disembowelled. It is recommended, at least

in towns of over 3,000 inhabitants, to have killing rooms for pigs on one side of the slaughterhall, and for cattle and sheep on the other.

(*b*) A pig scalding room and a room for washing tripe, etc. If there is a special slaughter-hall for pigs, arrangements must be made for scalding, with ample means of ventilation above the scalding tanks.

(*c*) Stalls for the various species of animals as near the slaughter-rooms as possible.

(*d*) Manure-houses.

(*e*) Closets, etc.

(*f*) Slaughterhouse and stalls for diseased animals, in which the parts of the animals unfit for human food may be sterilised and melted down.

(*g*) Drainage and disinfecting accommodation.

(*h*) Slaughterhouse for horses, if such are to be killed.

(*i*) Machine and boiler-house.

(*j*) A cold room.

(*k*) Lavatories for the butchers and their assistants.

(*l*) Freibank for the sale of inferior meat.

(*m*) Offices and dwellings for the officials and meat inspector.

The premises included under *d*, *e*, *f*, and *g* must not be connected with the main building.

The latter four should be added, if possible.

If it is intended to have a fat-melting factory or an albumen factory in connection with the building, special permission must be granted, and care must be taken that the gases should be made harmless, either by passage through fire or other means.

Size of the Slaughter-rooms.—The size of these is to be determined by the largest number of animals to be killed daily on the following principles. For large cattle cranes are necessary, $5\frac{1}{2}$ square feet being required for each without reckoning the space for walking round them. There should be several reserve cranes beyond the actual number in use. Each large beast requires two hooks. In the slaughter-hall for the small animals there should be rows of hooks arranged, each hook being 10in. to 12in. apart. These hooks are to be fitted up on

framework. For the slaughter of one small animal there must be at least $3\frac{1}{2}$ square feet of ground space for half an hour and nine hooks. In the pig-killing room there must be as many hooks fitted up as is necessary for the largest number of animals killed daily, each hook being 12in. apart. The space required in the scalding room is $5\frac{1}{2}$ square feet for each animal killed daily, or at least 450 square feet of ground space. There should be four hooks for every pig. If the largest number killed daily cannot be determined, the space can be computed according to the number of inhabitants, reckoning for every 1,000 inhabitants as follows: Large beasts, 9 square feet; small animals, 26 square feet; pigs, 20 square feet, supposing that killing will take place every working day. The slaughter-rooms should be at least 50 feet square in area.

Fitting up Slaughter-rooms.—The floor of the slaughter-room and the room for cleaning the entrails of the animals must be firm and tough, so that it will not crack if heavy objects fall on it or with the stamping of the animals, it must be absolutely water-tight, must dry up quickly, and, finally, must not be smooth. A thick layer of cement, hard clay, flags or brick plaster, brick floors, etc., are the most suited for this purpose. The flooring must be sloped all round. There must be a drain at the lowest point into a gulley and trap, to prevent the gases from the drains penetrating into the slaughterhouse. The inner walls of the room for 6ft. high must be cemented and painted with oil colour, or else built in glazed bricks or tiles. If the building is not entirely roofed there must be massive concrete vaulted roofs or plastered ceilings over the room for the cleansing of the interior portions of the animals and in the pig-scalding room. If the rafters of the roof are open in the slaughter-room they must be painted in *two coats* of oil colour. The sills of the window must be at least 5ft. 9in. above the floor. The doors and windows in the road elevation must be so arranged that the public cannot see into the slaughter-room.

Mechanical Appliances necessary.—There must be provided:

(*a*) For large animals, the necessary number of hoists and floor-rings, and also a number of frames fitted with hooks.

(*b*) For the room for smaller animals: Hook fittings to the number prescribed in par. 3, and some killing jacks or trestles.

(*c*) For the pig scalding and killing room: A scalding vat, a crane arrangement for lifting the animals above it, movable appliances for the removing of the bristles, and also the number of hook fittings required according to par. 3. The latter should be reached by cranes. There should be rings and hooks fitted in the walls close to the ground for securing the animals.

(*d*) For the cleaning of the inner parts: Several troughs, some tables, and a boiler for scalding purposes.

(*e*) For the several rooms of the building there should be a supply of cold, and if possible of hot water.

(*f*) It is advisable to have a *steam boiler*, so as to have a supply of steam for the warming of water in the scalding tanks, and of the cold water cistern in winter, and also to have a supply of warm water direct. In every case a hand-pump must be fitted up, so that cold water can be pumped up into an elevated tank.

Ventilation of the Slaughter-rooms.—The windows must be fitted so that the upper parts all open. Ducts must be formed in the side walls opening into the slaughter-rooms, and leading right out above the roof, and be provided with exhausters.

Mechanical Appliances in other parts of the Building.—The horse slaughterhouse is fitted with cranes, hook fittings, a scalding tank, and clearing troughs. The height of the room must be 18ft. The exit from this room must be separate from the other passages, and there must be special drainage.

Removal of the Waste.—The liquid waste must be separated from the solids. The drainage must only be led into a river when it has been mechanically and chemically purified in a scientific fashion, and when there is no possibility of the sludge being directly applied to economical purposes. The solids must be kept in lightly constructed iron waggons, and regularly carried away. It is advisable to unload these waggons under cover, the floor being provided with shoots. Manure pits are not recommended, but if they are used they must be cemented all over; the floors and walls should then be asphalted, and the top made so as to shut tightly.

Management.—The slaughter-rooms, cleaning-rooms, utensils, drains, etc., must be kept in good order and scrupulously clean.

The walls and floor of the slaughter-room must be carefully cleaned after slaughter, and then hosed down.

Special Permissions.—For tallow-melting, bone-boiling, and albumen-making, special permission must be given.

What is requisite when such Buildings are projected.—Before a slaughterhouse is built all the above conditions must be agreed to, and also those of July 19th, 1884. Besides the actual plans of the building, there must be a plan of the interior and a level plan, showing the water supply and the drainage. Beside meeting with the above requirements, the plans of the slaughterhouse buildings must be submitted to the approval of the Master of the Board of Works.

Although every unnecessary luxury is to be avoided, it must always be evident that "an acceptably and practically appointed establishment will soon make a friend of the most ardent opponent, and have an influence for good on all those connected with it, so that the striving after order, cleanliness, and humanity, will be essentially furthered, and these things will thereby be urged on others." Then the whole building must be tastefully laid out and of solid good material, which will wear well, it being borne in mind that the wear and tear of material of every kind are greater than in any other public building. Further, in order to remove as much as possible the gloomy impression which a slaughterhouse involuntarily makes, the open spaces not required might be turfed, if feasible, and where it can be done, trees and shrubs might be planted; but still the practical side must not be neglected for the sake of fine surroundings, as is the case in some slaughterhouses.

It is very important for the whole establishment that a manager be appointed as early as possible, at least before the building is fitted up, especially if the choice falls on one who has filled a similar position. In several large towns (Magdeburg, Mannheim, Cologne, and Düsseldorf) the manager was appointed as soon as the building began, and even in smaller towns (Glauchau and Riesa) he was appointed soon afterwards.

Several experienced managers, or an expert of standing, should be consulted for advice as to the plans. They will thus be made practical, mistakes will be avoided from the first, and money will be saved, as alterations usually cost a good deal.

CHAPTER VI.

SPECIAL DESCRIPTION OF INDIVIDUAL BUILDINGS

Figs. 1 and 2 (pages 67 and 68) show slaughtering establishments for towns of 10,000 inhabitants. The single buildings are appointed as is described in the foregoing chapter.

Walling and Paving.—The whole piece of ground should be surrounded by a close fence or, better still, by a massive wall. The yard that is *partly* enclosed, as we find it in several small slaughteryards, or only surrounded by a wire fence, does not recommend itself for various reasons.

Instead of the customary hinged gates, there is in Bremen a lifting gate of trellised iron, in one piece, attached to two chains which run over pulleys fixed on the gateposts. If the gate is to be shut it is pulled up from a pit made for it in the ground, the latter being provided with a covering, and if it is to be opened it disappears again.

Too little value is attached to the paving of the place; in some slaughterhouses they have tried to remedy this by a layer of gravel, although in the interests of cleanliness a paving with hard stones would be preferable.

Curb stones, which are sometimes put right round the halls, should be of granite. These should be left out where the animals and carts are to be driven in.

ADMINISTRATIVE BLOCK, DWELLINGHOUSES, ETC.

A building for the manager is necessary even in the smallest slaughter-yard, and must at least contain a room for the manager and the trichinosis inspector. This is best situated so that the whole yard can be seen from it. As the manager generally attends to money matters as well as his other business, in small establishments at least, an office window must be fitted up so that the butchers do not need to go into the office when paying their

dues. In larger establishments there is besides this an office for the Slaughter Committee. In the former room an ambulance-chest should be in readiness so as to render first-aid to any butcher who injures himself in the course of his work. Further, it is distinctly desirable that a collection of pathological preparations should be on view in the building.

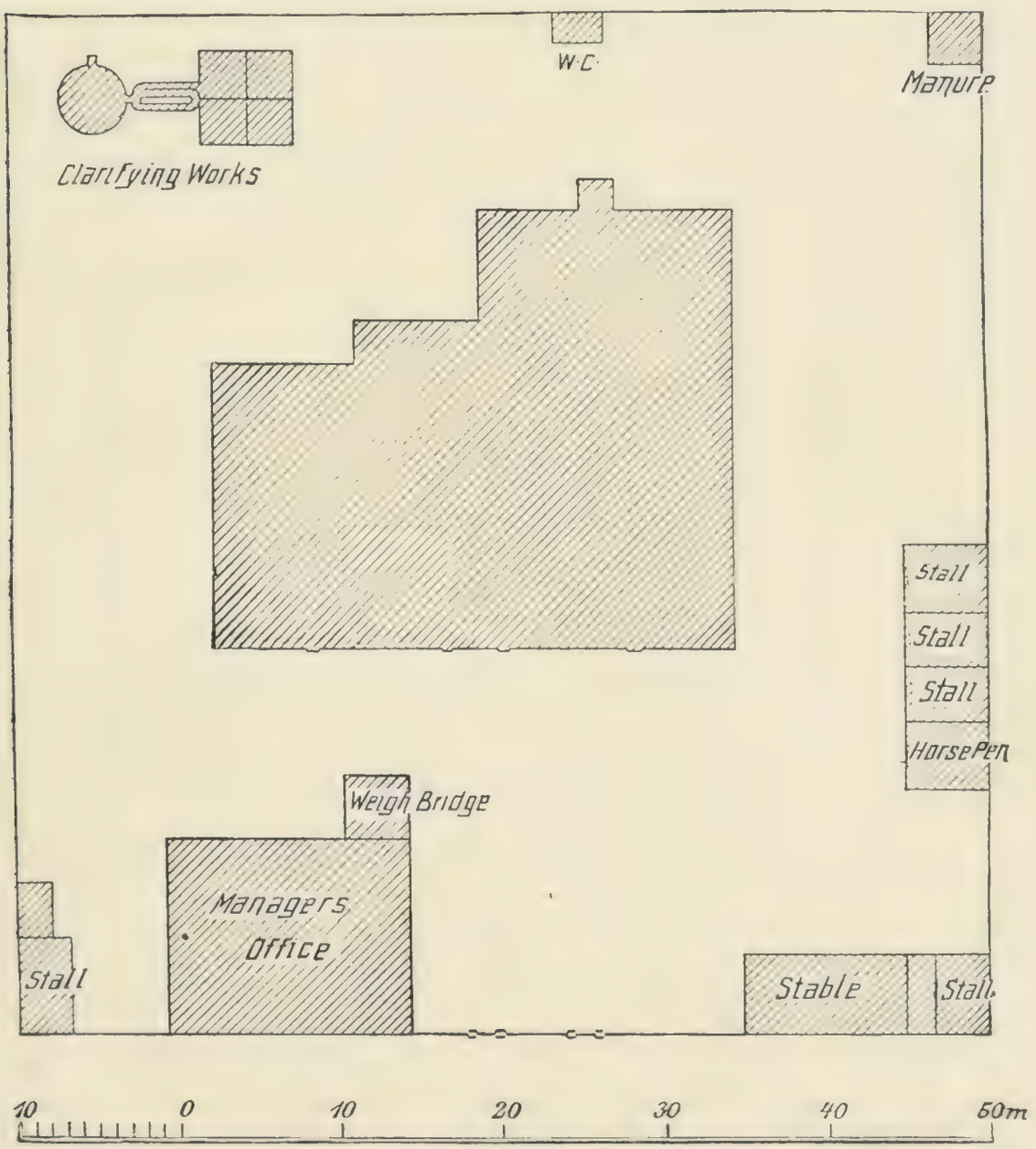


Fig. 1.

In towns with a telephonic communication it is very important that the slaughterhouse should be connected with it, especially as it is usually far from the centre of the town. As a matter of fact slaughterhouses are usually found telephonically connected with the municipal buildings and the police courts.

The room for the veterinary inspector must be well lighted by windows from the north, so that the microscopes are free from direct sunlight; there must be no wall opposite to throw back the light.

In larger institutions the trichinosis inspection room is in the neighbourhood of the pig slaughterhouse, either over the pig-pens or

Fig. 2

in a gable built for the express purpose. The latter is most to be recommended. The meat to be inspected is carried upon trolley-tables.

If there is a special room fitted up for the master butchers in the manager's department, it is safe to say that it will be

very little used unless refreshments can be obtained there. (This is hard on the butcher! —Eds.)

Such a room in conjunction with a restaurant in the manager's department has given occasion to many differences, especially of late. But in spite of the fact that too great a stress is laid on this point in many slaughterhouses, as the best rooms are used for this purpose, while less favourable places are fitted up for the management, experience has shown that the restaurant is not only easily dispensed with, but for many reasons is really damaging to the establishment. If the manager lives in the building he is not always sure of pleasant neighbours by this arrangement, and, as a matter of fact, an unsatisfactory state of things sometimes exists in a number of slaughterhouses, as the author has had personal opportunities of witnessing. Altogether in many towns there has not been the least regard shown for the standing and grade of culture of the manager in the appointment of his dwellinghouse, and a place is usually allotted to him which would do very well for an inferior official but not for the manager of the establishment, who may have a fair academical education. It is only lately, and in quite isolated cases, that we find these buildings more comfortable (with baths, etc.) and more roomy (five or six rooms). It is perhaps only necessary to give these hints, so that in future more importance will be attached to this point.

If it is thought advisable to have a kind of inn in the slaughterhouses of towns of from 10,000 to 50,000 inhabitants, a canteen should be provided, which should be in a wing of the slaughterhouse or in its neighbourhood, but such a building should in no case ever be attached to the manager's premises. Such canteens exist in Eisenach (rent £10 annually) and Nuremburg (rent £15). Larger inns are to be found attached to the slaughterhouses of Glauchau (£87 10s. rent), Cassel, Riesa, Potsdam (each £75), Gotha (£55), Wiesenfels (£53), etc. In almost all Pommeranian slaughterhouses we find no inn attached. In some places (Erfurt) it has been necessary to close existing places of the kind. Of course, an inn is to be recommended in establishments where there is a cattle market, as it then may bear the character of an "exchange," especially as the management will draw quite a considerable income by letting it. These are let annually at the

following terms: Berlin, £2,600; Leipzig, £1,063; Dresden, £1,050; Magdeburg, £665; Munich, £500; Danzig, £375; Wiesbaden, £350; Elberfeld, £250; Chemnitz, £225; Bremen, £215; Barmen, Halle, £200; Dortmund, Zwickau, £175; Bromberg, £150; and Haben, £50. Besides these large inns, there are in many of the larger slaughteryards both small canteens and cook shops.

PORTER'S HOUSE, WEIGHING MACHINE, AND HARNESS-ROOM.

These three buildings, along with those mentioned in the last paragraph, form a special department, which is separated by a wall from the slaughter and cattleyards in various new and especially large establishments (see Chapter XIV.), such as Breslau, Mannheim, Leipzig, Zwichau, etc.

Fig. 3.

A small porter's lodge, made of corrugated iron (see fig. 3), is usually to be found in the larger establishments, and either stands just at the entrance, or where slaughterhouse, cattleyard, and entrance yard meet. The porter's house and the weigh-house are often united, as the porter has frequently to combine the office of weigh-master with his other duties.

If a special weigh-house (which can

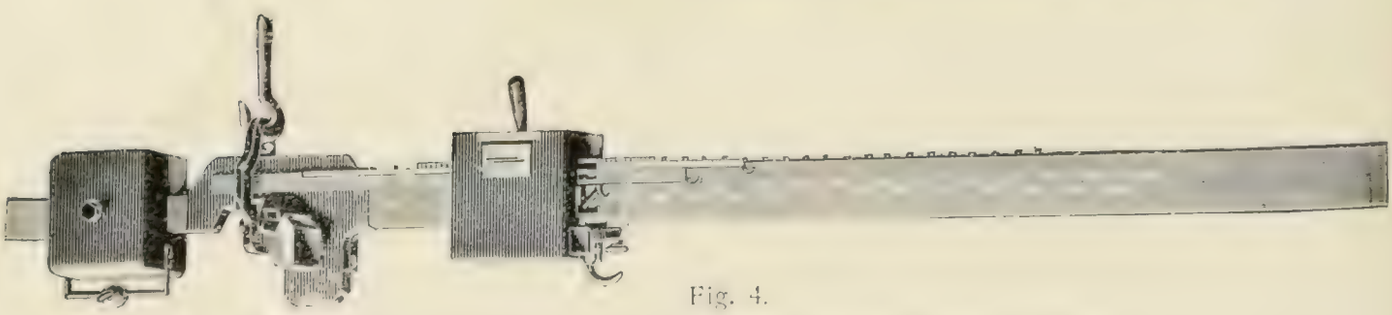


Fig. 4.

Thousands.	Hundreds.	Tens.	Kilos.		
8	5	3	2	Gross.	.....
1	4	7	1	Tare.	Date.....
				Nett.	

Fig. 5.

also be of corrugated iron) is not provided, the weighing business can be attended to outside the office, as in Naunburg, Potsdam, etc. But this arrangement has many disadvantages.

The most preferable cattle weighing machine is that with a

movable weight lever and a card-stamping apparatus (figs. 4 and 5 show the lever and weighing-card belonging to it, reduced in size). A special weighing machine is shown in fig. 6. Instead of the single opening doors, one firm has manufactured some with double doors which, by means of weights, open vertically (see fig. 7, page 72). These are opened more easily when the animals are restless. These weighing machines can also be made on the running-weight system.

Near the weighing machine there should be a transportable cattle gangway and waggons for the transport of pigs and small beasts (fig. 8, page 73). For injured and lame pigs the car constructed by Slaughterhouse Director Koch, of Barmen, is to be specially recommended. By its use irritation to the animal is prevented, as the movable plate can easily be pushed under the animal.

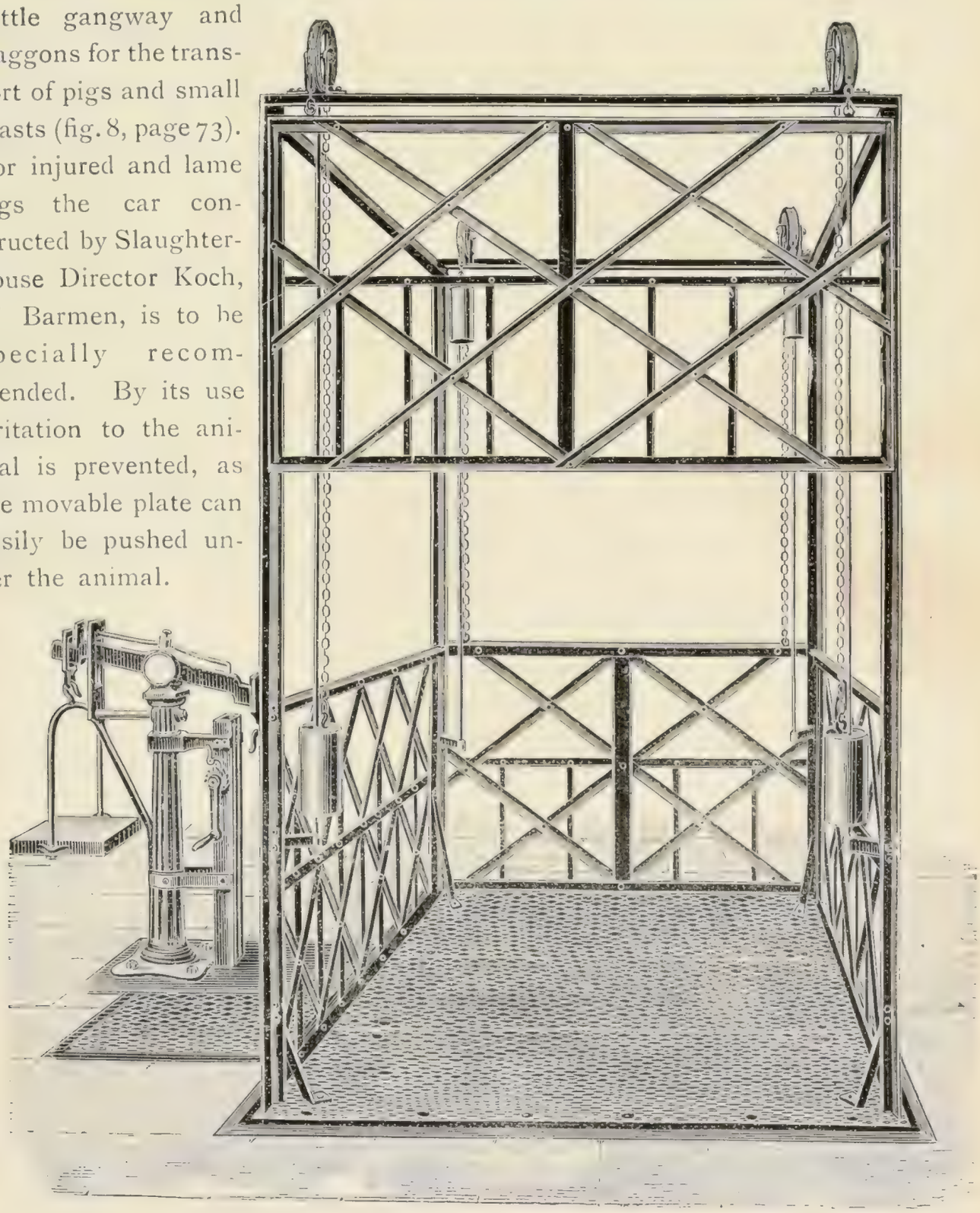


Fig. 6.

There should be a stable for horses in connection with the sheds, the upper storey of which can serve for keeping fodder and straw in small establishments, while in larger buildings it is better to find place for these over the cattle-houses.

THE SLAUGHTER-ROOMS.

The slaughter-hall with the rooms belonging to it should occupy the centre of the whole ground. (See fig. 1 and 2, pages 67-68.) The principal entrance leads directly into the slaughterhouse, down the length of which lies the central gangway which in smaller establishments is not of much importance, but is indispensable in larger buildings. The slaughtering-halls contain four parts, the left being the killing place for large animals, opposite it that for smaller animals, while to the right of the entrance lies that for pigs, and opposite it is the pig-scalding room.*

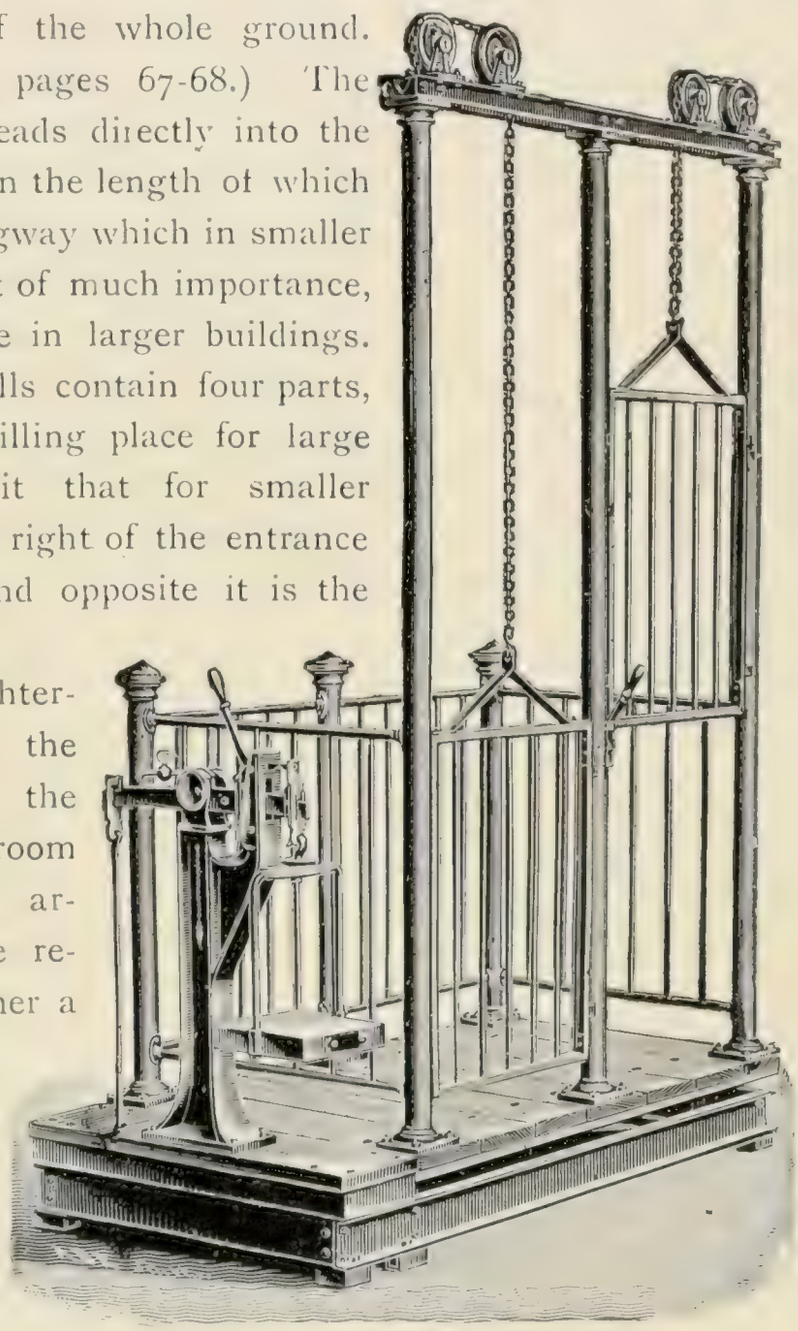


Fig. 7.

In very small slaughtering establishments the scalding-room and the tripe, etc., washing-room are combined—an arrangement *not* to be recommended. Whether a special room has been fitted up for the purpose or whether the scalding tanks are placed in the middle part of the large hall—the steam reaching the meat hanging around, and exercising an unfavourable

* There are solitary cases where the bristles are not removed by scalding, but by singeing. In Germany, as is well known, this was done until lately in the slaughtering establishment of Koopman, of Hamburg. This is done in a special room (called in France a brûloir) by means of a straw fire, while in Ireland they have special singeing stoves for the purpose It is clear that the ancients singed their pigs instead of scalding them from a reference in *Homer* (Odysee xiv., 75). Meat of singed pigs keeps better than that which is scalded. There are several modern singeing "stacks," as they are called, used in bacon factories and other places. Illustrations of them are given.—Eds.

influence on it—special means of ventilation are desirable. We shall further speak more fully of these.

There should be direct communication between the slaughter-houses for large and small animals and the stall accommodation, while the pigsties and the scalding-room should also be accessible to each other. In the latter the killing, scalding, and bristle-removing take place, and the further preparation goes on in the pig-killing room.

As has been intimated in a former chapter, the opinions as to the direct connection of stalls with slaughterhouses have been very much divided, because in the case of injudicious management of the stalls the danger exists that odours and deleterious vapours find their way into the slaughterhalls and affect the meat there. This can be prevented by well-closed doors and strict instructions being given that they are to

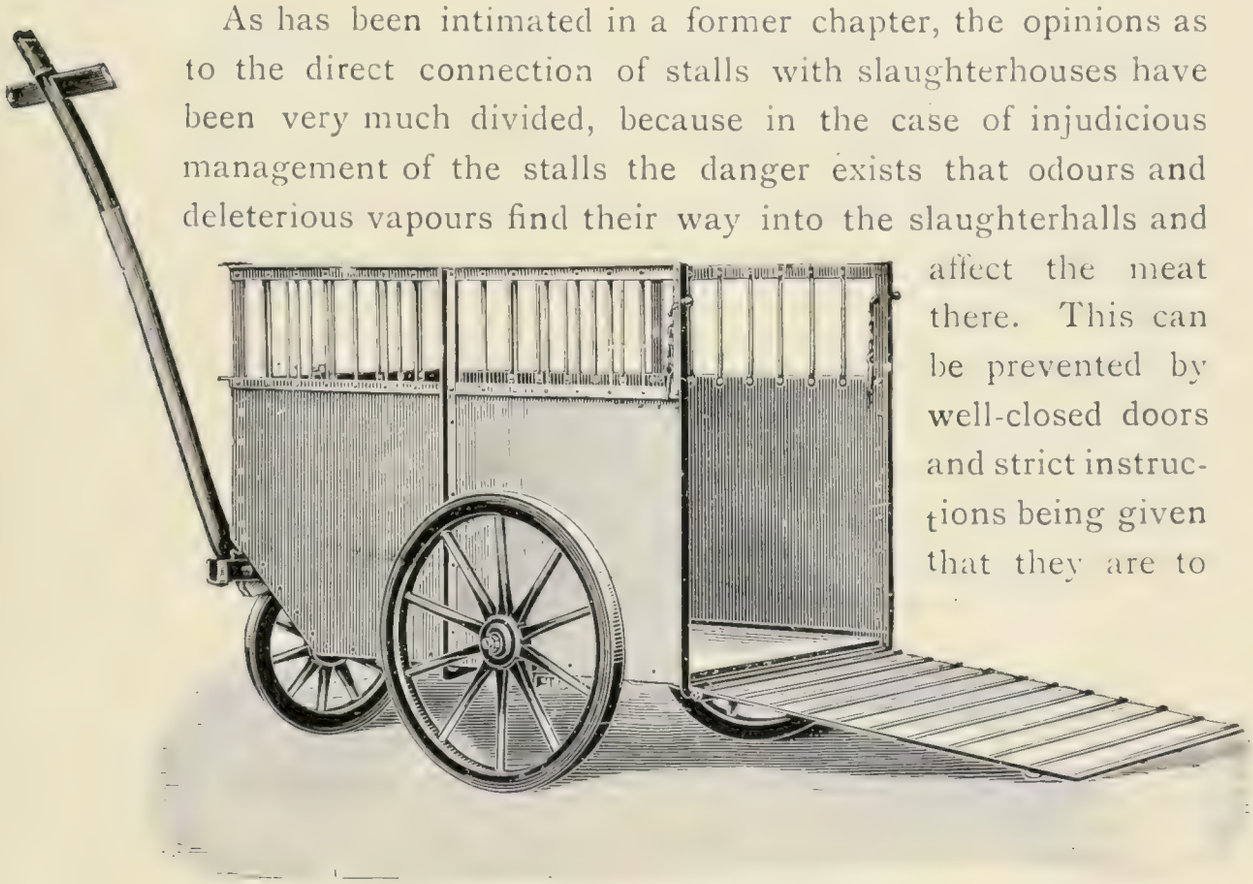


Fig. 8.

be kept shut (better, self-closing fittings), by scrupulous cleanliness and good ventilation. It has also been suggested that an entrance-room should be fitted up, as we shall see further in the discussion of the manure-house—a sort of receiving or workers' room—yet so arranged that the animals may be driven through it. At all events some kind of connection between the two places offers the great advantage that the animals can be driven straight into the slaughtering place without being taken into the open air, whereby much torture and the possibility of escape are prevented. The animals are driven into the stalls through

special outer doors. The roofs of all the adjoining buildings are, of course, somewhat lower than that of the actual hall.

Near the pig-killing place and sties are two rooms accessible from the hall—one for the men to undress in, etc., and one for the hallmaster and also for the official belonging to the Jewish synagogue. Slanting across from the principal entrance to the left side is the entrance to a narrow passage which leads to the manure-house to the left and to the refuse-house to the right. The door to the right of the principal entrance leads into the receiving room or air lock, giving access to the cold-room adjoining it. Near the cold-room, and accessible from outside, is the boiler-house, one corner of which includes the coal-house, this being filled from outside, while the other corner on the left of the entrance serves as a workshop for repairs. A staircase leads from here up into the second storey, where the engine-room is situated and also the water tank. In small establishments without machinery there is, instead of the cold-room, a room for a hot water boiler, while at the same time there is a corresponding reduction in the size of the other rooms. On the right side of the court lie the horse slaughterhouse and the police or sanitary slaughterhouse, each with a stable. At the back of the yard is a walled pit for the stable manure, together with lavatories, and the buildings for cleansing purposes.

DESCRIPTION OF A SLAUGHTERHOUSE FOR A TOWN OF FROM 20,000 TO 30,000 INHABITANTS.

Figs. 9 and 10 (see pages 76 and 77) show plans of a slaughter-house for towns of the above size. The situation of the individual buildings is as follows: The offices, etc., of the manager, the weighing-house, and perhaps also a second dwellinghouse for officials at the entrance are at 1; further, in the neighbourhood of these, a cartshed and stable, rooms for the hallmaster, the yardmen and the artisans, and also a couple of lairages for large and small animals. In larger establishments it is advisable that the rooms for the sub-inspectors, the artizans, etc., should not be in special buildings, but formed at the gables of the halls. In Cologne the journeyman's room is above the horse stable and harness-room. The stables and adjoining buildings are separated from the large special building in the middle by a road, in which are to be found the common stalls for large and small beasts, and the pig

slaughterhouse, with sties and scalding-room annexed to it. Across from the two halls lie in one row the cooling-house, containing the cold-room proper and the cooling-room, from which the special inspection room is separated, also the boiler, engine and coal-houses, the workshop for repairs, a water tower with Freibank underneath, and a room for a sterilising apparatus.

ON CONNECTING PASSAGES.

A connection is arranged between the cold stores and the slaughter-halls by means of a broad road with a glass roof, and designated the "Connecting Passage." These connecting passages have only lately come into fashion, and are to be found in Breslau, Guben, Essen, Königsberg, Kottbus, Halle, and Mannheim in complete perfection, while those in smaller establishments like those in Apolda, Cleve, Eschweiler, Gotha, Naumburg, Riesa, Tilsit, Unna, Weissenfels, Wesel, etc., can only be called "inner" connecting passages. All these passages offer a great many advantages for business purposes which are not to be underrated, as the cost of outlay is not much, the walls being formed by the buildings on each side, while the laying-out of streets between the individual buildings is saved. This passage consists of a broad cart road and two side paths, the whole lighted from above. This connecting passage forms the principal artery for traffic in the slaughterhouses; along it the meat is transported from the halls to the cool-houses, and in it are kept the waggons or carts for fetching meat from the halls or the cool-house, and are thus protected against wind and weather, dust and sunshine. A similar passage is formed between the halls and the refuse-house and manure-house. If the trolley cars, etc., described below, are employed for carrying off the refuse, and the passages to the refuse-house have a good incline, this house can be built quite near the slaughterhouse; but if the refuse is carried off in barrows, and there is little slope, the manure-house must be further removed from it. The possibility of an enlargement of the halls must be taken into consideration when laying out the plan. The waggons for carrying away the manure should be kept under the manure-house. The horse slaughterhouse and the sanitary slaughterhouse, with their stables, lie quite apart, but they can be combined (see Chapter VII.

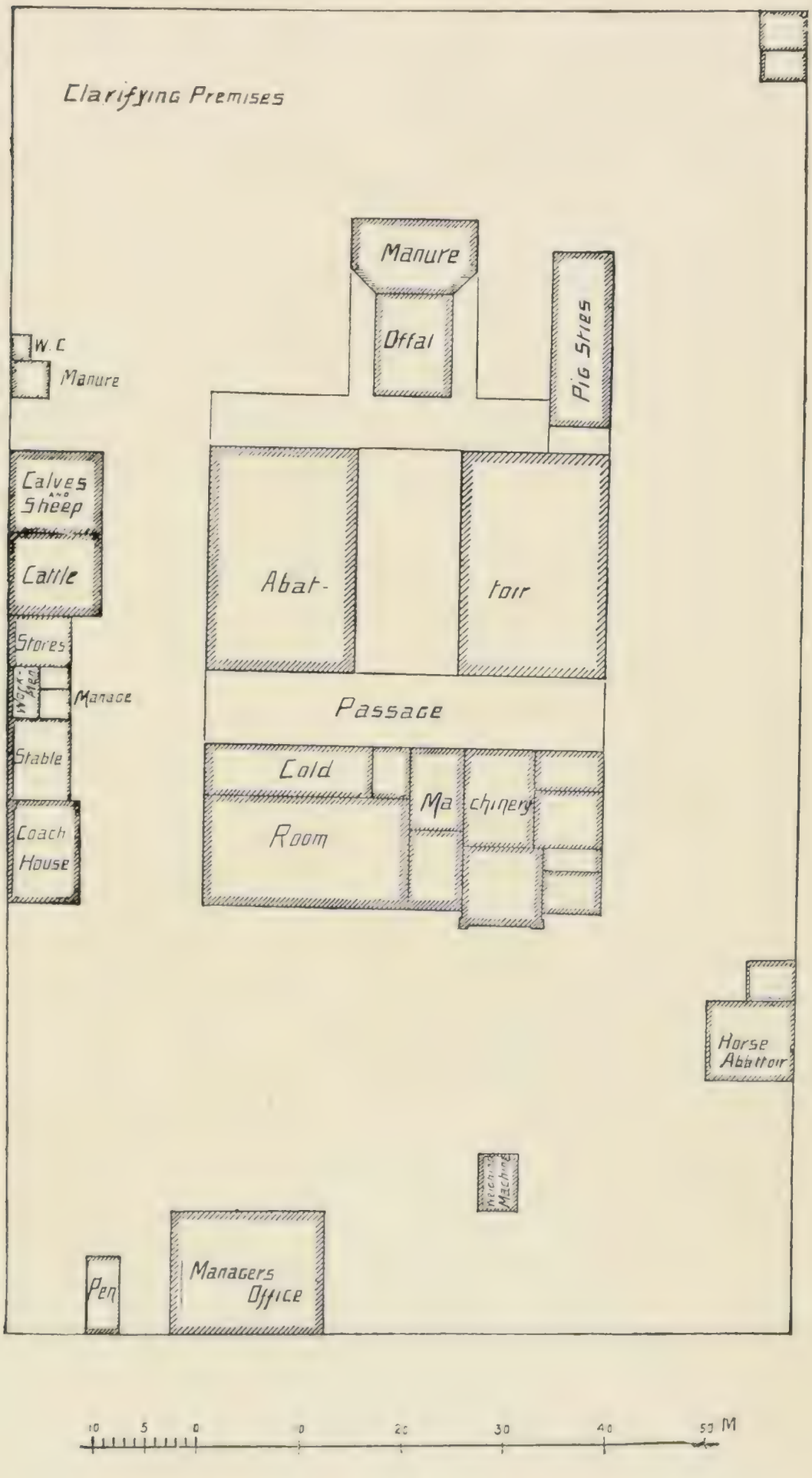

Clarifying Premises
Manure
Offal
Pig Sties
W.C
Manure
Calves and Sheep
Cattle
Stores
Manage
Stable
Coach House
Abat-
toir
Passage
Cold
Room
Ma
chinery
Horse Abattoir
Managers Office
Pen
10 5 0 0 20 30 40 50 M

Fig. 9

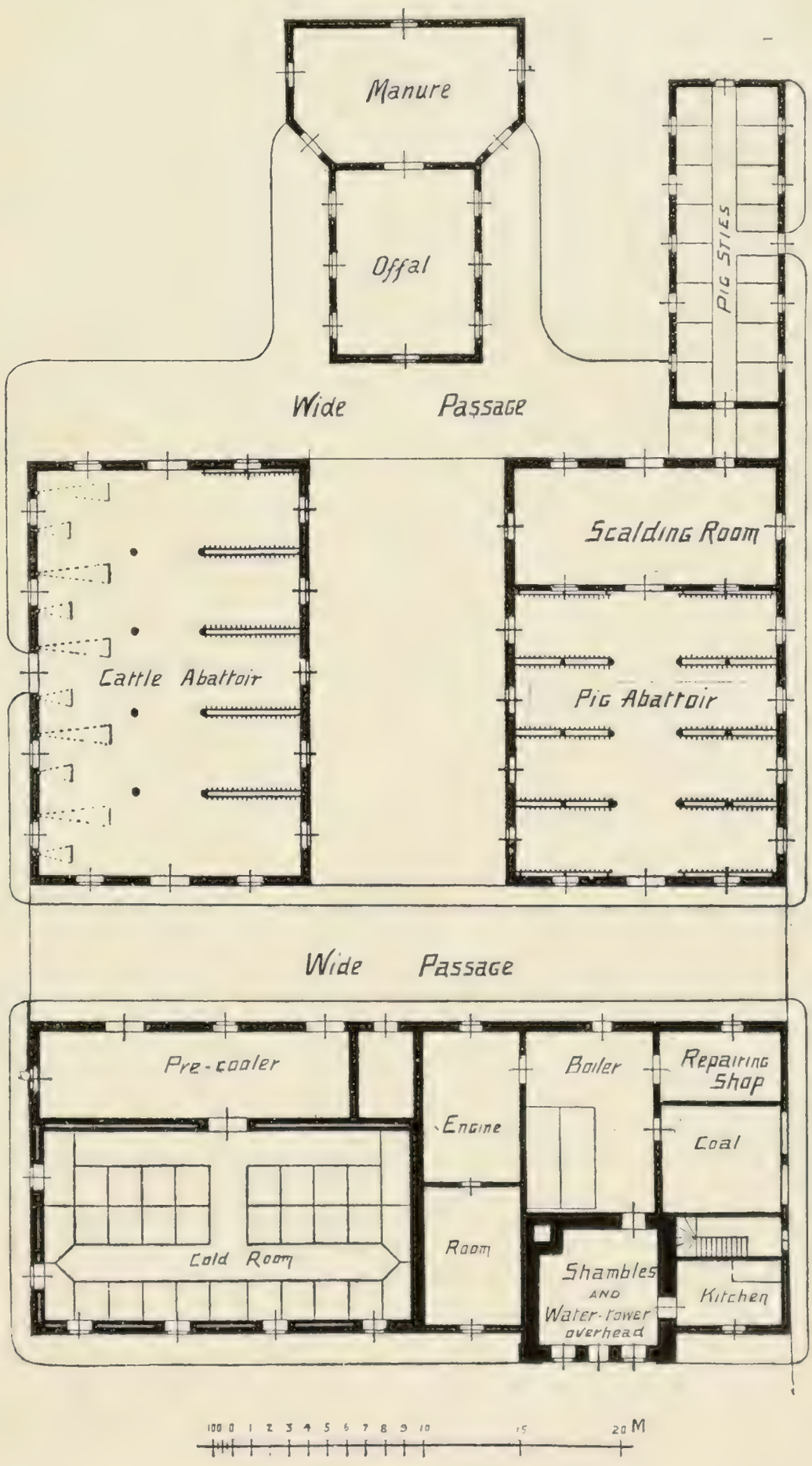

Manure
Offal
Pig Sties
Wide Passage
Scalding Room
Cattle Abattoir
Pig Abattoir
Wide Passage
Pre-cooler
Engine
Boiler
Repairing Shop
Coal
Cold Room
Room
Shambles
and
Water-tower
overhead
Kitchen
100 0 1 2 3 4 5 6 7 8 9 10 15 20 M

Fig. 10.

MANURE-HOUSE AND THE REMOVAL OF MANURE.

The planning out of the premises for cleaning the intestines of the animals, and for the manure-house, presents some difficulties. These buildings must be so arranged that if possible:

1. They can be reached from each of the slaughterhouses without the workmen having to go into the open air, as the work they are engaged upon is very heating; at the same time the vapours from the cleaning-house must not get into the slaughter-halls;
2. The waggon loaded with refuse must be easily pushed into the manure-house;
3. Or that the manure can be carted away without being first emptied into a pit.

These requirements are met by the laying out of the manure-house and offal dressing-room, as shown in the plan (fig. 1), where a little passage connects them with the slaughter-hall. We shall return later to the discussion of the situation of these rooms, and will now consider the different modes of removing the refuse. (For the best methods of collecting the manure, its value, and the prices obtainable for it, see Chapter VIII.)

The methods of getting rid of the manure and refuse are:

1. By having a regular place of deposit for it.
2. Carrying it away subsequently.

The former can either be common open pits or covered spaces.

The common open manure-pits, which are mostly situated behind the manure-house, consist of cemented, water-tight receptacles, into which are put all refuse, running blood, parts of skins, the waste contents of the intestines, etc., and are only emptied when they will not hold any more. As hardly any attention is paid to the influences of wind and weather, the ingredients these pits contain soon putrify, poison the air, and become the breeding ground for countless microbes.

These *open* manure-pits should *only* be used in slaughterhouses as *receptacles for stable-manure.*

From the sanitary point of view the *covered* manure-pits are more desirable on account of the convenience of emptying; they can be built either below the manure-house, in the form of a cellar, or at one side of it. They have all the advantages of an open pit, and they keep the manure covered as well, protect it from the influences of

the weather, limit the vapours arising, and, if well closed in, can be made almost uninjurious by mixing the contents with peat-straw, thus preventing the flowing out of the collected water while the removal of the solids is being effected.

The immediate carting away of the manure is another method which, in spite of its great advantages, has some drawbacks which must not be overlooked. The best arrangement is to have water-tight receptacles fitted with wheels and run in under the manure-house to receive the refuse, to be shot into them direct through a funnel, and taken away as soon as they are filled. In small establishments large casks suffice for this purpose, which can be hoisted on a cart and taken away. But there are special waggons constructed for the purpose by several firms. These consist of tanks made of strong sheet iron, with an opening at the top for receiving the contents, over which a cover can be slid when it is filled, and a tightly fastening trap-door at the back for emptying purposes. This waggon has the disadvantage that in winter the contents freeze, and cannot be emptied out, while at the same time there is a danger of the tank bursting. It is in the warmer seasons of the year that a quick removal of the manure is most desirable, while in winter it is quite unlikely that it will be left standing long exposed to the frost before being covered in and carted away.

Some consider the waggon system to be very tedious, and that a waste of time occurs in taking away the manure, as the man must always be there ready with his horse to carry it away. But if there are two or three carts this objection is overcome.

The usual box waggons made of galvanised iron, and provided with a cover, such as are used in the country for the removal of manure, suffice for the purpose, if there is a reservoir for dirty water with a pump fitted up alongside of the manure-house. As the slaughterhouse manure is only inoffensive as long as it is left alone, it is recommended that it should be emptied at once into the waggons; by this means, too, loading for carting off is saved.

Care must be taken that the place where these waggons stand is thoroughly cleaned and disinfected, and that the sewage which may flow out is carried off. In the slaughterhouse of *Stolp* the following arrangements have been adopted.

The manure waggon stands *under* the manure-house, in a space

with thick walls on three sides. The fourth side forms the *entrance*, and is closed in by means of two corrugated iron doors hung on two pulleys. The manure is shot from above into the waggons through a funnel-like opening in the arched cover of the waggon. The floor of this waggon building is cemented, and has sunk tracks for the waggons; it is provided with a slope down to the gutter, at the back, which discharges into a drain. There are also taps for hot and cold water, to which a hose can be fitted, so that the building and waggons can be thoroughly cleansed. In winter, too, the waggons can remain standing there without the manure freezing, unless it is very cold; in the latter case the building can be used as a manure-heap, and can easily be cleaned when the weather becomes milder.

In large slaughterhouses the manure can be removed by means of the railway waggons. This was first put into practice at Leipzig, and was adopted later on by other slaughterhouses. The manure is either dropped into special waggons standing half under the manure-house, or else it is first put into small tip waggons, the contents of which are then shot into the larger waggons. The Hamburg slaughterhouse possesses ten such special waggons.

In many small slaughterhouses little carts (like that shown in fig. 11) are used to empty the manure-house. Their contents are transferred to a waggon standing at a platform outside the building. This method is only suitable for a small daily killing, while the continual emptying of the new refuse amongst the older waste material creates a bad smell, which is sure to have an injurious effect.

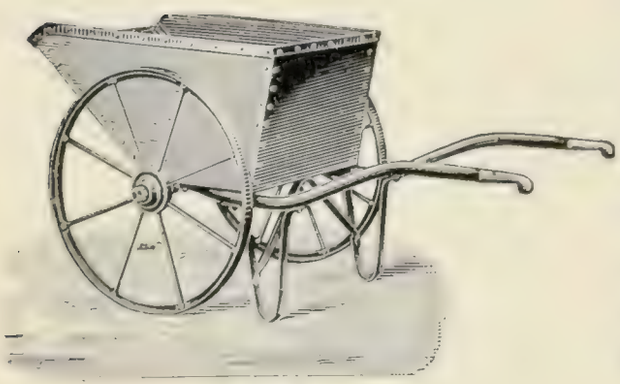


Fig. 11.

The most convenient method, and one that answers every requirement, is that adopted in the small slaughterhouses, planned as in figs. 2 and 57, where a passage leading into the slaughterhouses is arranged between the manure-house and the skin and offal cleansing house, along which the refuse waggons are run into the manure-house. At the upper end of the latter, about eighteen inches from the footpath, there is an opening about three

feet broad, which opens over a two-wheeled manure waggon pushed underneath at the back of the building. The top of the box of this waggon is four feet above the ground, and it runs down a small passage sloping towards the building, from which it can be easily driven away. If the large tip waggons are used, the manure-house must be higher, and the connecting-passage made with a gentle slope, while the slope for the waggons must have a steep incline.

Fig 12.

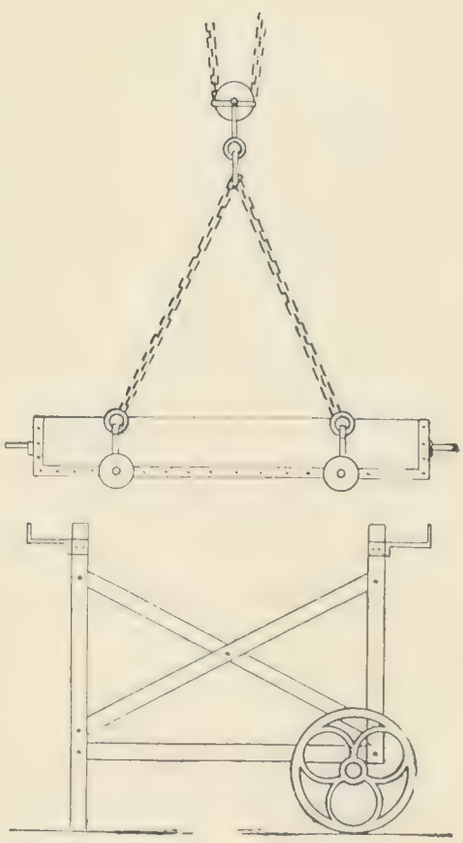


Fig. 13.

The manure-house and the intestine-house, between which lies the passage, should be about five feet higher than the floor of the slaughterhouse, and communicate with the latter by a staircase.

This high situation will lessen the chance of the odours from the manure-house penetrating into the slaughterhouse; there is also this advantage, that the waggons will be more easily moved away, as the slope will be just half the height, and, consequently, half the length. As the staircase prevents the offal waggons being run along, and a slope would be too steep here, the following arrangement has been adopted (see figs. 12 and 13). A waggon is formed with a movable table, which has a rim round the top, and small wheels at the bottom, so that it can be pushed under the animal, and when filled it is run into the middle of the hall, where there is a travelling pulley hoist, the four sling chains of which are fastened to the corresponding number of lifting rings on the table. The table is then raised and pushed into the manure-house as far as the discharge opening, where it is released from the chains and rests on the small wheels. The refuse can now be turned out, and the hoist be run back into the hall on an inclined track, and be used for the next offal waggon.

GENERAL FITTINGS OF THE INDIVIDUAL ROOMS.

The roof of the slaughter-halls usually projects three to six feet (in some places eight feet) over the outside walls, so as to provide a protection to the waggons while loading or unloading, and to prevent the sun's rays striking directly into the interior of the hall. The roof is best laid with flat tiles, supported on rafters, lathed and plastered on the under side.

Ventilation.—The slaughter-hall should have high windows with swing sashes. For instance, the window, or a part of it, may be made to move on a pivot by means of a winch or other arrangement. Smaller windows are required if large ventilation openings are provided in the outside walls below the windows.

In choosing effective ventilation arrangements for large rooms, it was formerly the custom, and, indeed, still is, for the handiest and apparently safest means to be adopted, so as to obtain the largest possible outlet openings. Thus cupolas, fitted with louvres, have been popular for a long time, but have lost favour in some places because it was found that in hot summer days, when there was no wind, the ventilation was imperfect, while on windy days there were draughts. It is of the greatest importance that the foul air of the halls should escape in every sort of weather, and consequently some have resorted to air shafts and cowls. The best arrangement,

however, is to use an open type of fan, so that absolutely positive ventilation may be obtained.

In order to prevent the sunbeams falling directly on the meat it is necessary to fit up either canvas shades or wooden blinds outside, or to have curtains or screens inside the windows, unless the panes are made of rough, obscure, or ribbed glass.

The doors, the number of which should be limited as far as possible, should be made to slide, and are best when constructed of corrugated iron. For the purposes of ventilation the lower part of these doors should be made of wirework gratings.

Hinged doors waste too much space, and as the refuse waggons are broader than one wing can be conveniently made, both wings must be opened for them to pass through, and to have to unbolt and bolt these continually is objectionable.

Interior Facings of the Walls.—So that the halls may be light and the walls easily cleaned they may either be rendered, six to nine feet high, with cement, painted with light oil paint or with enamel, or else lined with glazed tiles or bricks. (The latest orders issued by the Minister of Trade *forbid* the painting of the slaughterhouse walls with *red*.) The wood fittings must be painted with an inodorous material, as the smell from ordinary paint is often communicated to the meat hanging in the room. In Bischofsburg the slaughterhouse had to be closed on this account immediately after it was opened (see chapter on Refrigeration). Ordinary oil paint is not a success as a rule, and it does not last long. Enamel paints are preferable; they are very smooth and last a good time. If they are used on an old wall they do very well, especially if laid on good *old* cement or plaster, and in rooms where the walls do not require to be cleaned daily with boiling water. The best, but the dearest, lining is glazed bricks or tiles, and they must be set with close joints, so that there are no crevices for fragments of dirt to lodge in.

Imitation marble is a good wall-covering, and is easily cleaned and disinfected. It wears well, and is sold in slabs three to six feet square, in yellow and light red shades.

The walls above the glazed dado should be either whitewashed or distempered in light colours, but the ceiling should be painted with oil colour.

Cupboards formed of slabs of stone, wood, or iron are often built

into or out from the walls—mostly underneath the windows, and that these may be looked after and ventilated they are usually furnished with doors of finely-meshed wirework. In these are kept various utensils for slaughter, and also small pieces of valuable offal. These cupboards must be kept very clean, else they will develop odours that will be communicated to the entire building.

In the Hamburg slaughterhouse there are wirework cupboards right round the buildings. These are let out to the butchers—the larger for 9d. a week or 30s. a year, and the smaller for 6d. a week or £1 per year.

Flooring.—The floors can be laid either with asphalt, mosaic, cement with diagonal flutings, fireclay flags, slabs of cement, granite, or with special bricks or tiles.

Polished red Weser or Sollingen sandstone flags are very suitable. They are very much used in Middle Germany, and are comparatively cheap. The joints should be filled up with asphalt. Where slabs, mosaic, granitoid, or cement are used, a hard material in the form of a slab must be let into those places where the cattle will be split up, as pieces may easily be knocked out of the floor by the rebounding hatchet. (Oak boards about 3in. thick, about 15in. wide, and 5ft. to 6ft. long, can also be laid down, and they can be used as a cutting-up block.) In every case the material used must be water-tight and not too smooth, lest the animals slip on it in winter; therefore cement floors should be roughly laid with wooden trowels, while cemented walls must be carefully and smoothly plastered with iron trowels.

Above all things, care must be taken to see that the floor has a sufficient slope, and that there is ample channelling. The latter should be laid down along the halls, and the floor should slope towards them. *Channels on both sides of the centre passage are to be avoided if possible.* The centre passage should be the highest part and always dry and clean, and in cleaning the floor the dirt can be washed down from it to the lowest part at the sides. The running of the offal and blood-waggons over the gutters will thus be avoided, while waggons and gutters are in less danger of being damaged. If it is impossible to avoid having the channels in the centre of the hall, they should be as flat as possible, and only about 2½in. deep at the lowest point.

The waste water, after passing along the channels to the gullies,

which retain all the solid matter, is led into the main drain of the slaughterhouse, from whence it flows either into the clarifying-house or leads directly into a sewer, as will be described in Chapter VIII.

Water Supply, etc.—In towns with water supply mains there will be, of course, a connection to the slaughterhouse, at least for water for drinking and cooking purposes; if there happens to be a well on the premises from which water for other purposes may be drawn, but which is not suitable for human consumption, it may be so used. In the latter case, or when there is no system of water mains laid in the town, the water is pumped into an elevated tank, and led from it to all the different buildings. In large establishments a water tower is erected for this purpose, on the ground floor of which a local "Freibank"* may very conveniently be situated (see fig. 10), while in the upper part a large clock may be placed. This tower is very often part of the management buildings, or over the entrance to slaughterhouses. If the owners of small slaughterhouses do not wish to erect a special water tower, the tank can be built over the engine room or the cooling room (see fig. 2). A hot water cistern, heated by means of a steam coil, is not necessary where a circulation arrangement can be used. Cold water can be turned on and allowed to run through the latter, and on its leaving the apparatus it will be of the desired temperature. That is not always the case with hot water cisterns, as the temperature of the water they contain varies, because as water is used cold water rushes in and cannot be warmed as quickly as required by means of the coil. Water can also be quickly heated by a direct steam pipe.

Wall pumps are to be recommended for small slaughterhouses. They work excellently, and they make the use of a large steam

* "Freibank."—This is an institution attached to many German abattoirs in which cooked meat is sold. This meat is cooked under the supervision of the abattoir authorities, and consists of meat which is suspected of being unsound. Much attention has been given to the subject of meat inspection in Germany, and the best authorities have arrived at the conclusion that meat which is only *doubtful* may be sold if cooked at a sufficiently high temperature to kill the spores of germs. As no guarantee could be given of this being done in the pr vate houses of the people—especially the poor people—the authorities of abattoirs do the cooking themselves. There are two well-known cooking apparatus used for this purpose invented by Dr. Rohrbeck and Dr. Hartmann respectively, and a full description of these will be found in the appendix. As the abattoir authorities cook suspected meat, so also they sell it, and the place of sale is termed the "Freibank."—EDS.

engine unnecessary in winter. Pulsometers are also well suited for this purpose.

An underground water main has many drawbacks, particularly the possibility of freezing up. This is principally because the pipes are not laid deep enough, or are so laid that the deepest pipes cannot be got at. This can be prevented if the pipes under the halls can be reached by manholes outside, and secondly if the taps are not fixed up against the walls, but in different places all over the halls, and, if possible, if hydrants are put up at both sides of the centre passage (fig. 30) attached to the columns. A sufficient number of taps should be provided with hose fittings, and it is advisable to have enamelled drinking cups attached to a chain, and fixed to one or two of the cold water taps. If these taps must be near the wall, it should be arranged that they are fixed several inches from it, and are accessible from every side. It is absolutely necessary that there should be several sliding sluice valves in the water main—at least one in each building—and that these are provided with drain cocks, so that the whole water service can be drained off in winter. A plentiful water supply must be arranged for in every room, including the stable, hanging room, lavatory, etc.

In the heating of the various halls where heating may be deemed necessary, waste steam may be utilised and the heat distributed through gilled pipes, but these must be fixed at a sufficient height above the floor both in the slaughterhouse and anywhere else where the pipes may be damaged by the continual cleansing with water that goes on. In all rooms, however, where this cleansing is not needed and a regular heat must be kept up, a radiator is recommended.

It would be a good thing when planning a new slaughterhouse, to take into consideration the possibility of it being fitted with heating pipes at some future period.

Lighting.—There is only one kind of lighting absolutely faultless for a slaughterhouse, and that is by electricity, especially if there is a cold store. It would be difficult to replace it, too, for inspection purposes. (In Chapter XI., this question is fully gone into.) Gas develops vapours and has the drawback that if it has to be left burning, turned low, all day in some parts of the building, it must either be turned on all over one room and a considerable amount of gas wasted, or if only some of the burners are lighted by the turning on of separate taps,

these burners are soon unfit for use by being lighted from the top. Of course a town in possession of gasworks will be unwilling to forego the not inconsiderable income from the slaughterhouse lighting, but will rather, in most cases, especially if the institution is a small one, fit it up with gas; but if there is no gas in the place, electric light should certainly be chosen. It will be seen from the following calculations that it is not dear, especially if its special advantages are taken into consideration. A well-known firm of electrical engineers have made the following estimate: For towns of from 20,000 to 30,000 inhabitants (fig. 9) the electric light required in the building would be a hundred incandescent lights of 16 c.p., and eight arc light lamps of six ampères. The incandescent lamps would be for the lighting of the inner portions of the building; five arc lights would be for the slaughter-hall and three for the yards. The cost of this installation, including engine and dynamo, would be about £500.

As a steam engine is required in larger establishments in any case, then increased size of engine would cost less than a separate engine—about £100 less may be reckoned on.

For the slaughterhouse of a small town (fig. 1), seventy incandescent lights of about 16 c.p., and four arc lights of four ampères, will be fully sufficient. The cost of this would be about £400, including a steam engine. This light would suffice for a larger establishment.

If accumulators are provided, the inspecting medical officer can use this source of electric energy for the charging of a small portable electric lamp. These lamps not only give an admirable light, but are easily carried.

According to an estimate of one firm, the gas lighting of a slaughterhouse, as in fig. 1, requires thirty lights (hanging and wall lamps), those for the larger rooms being double-armed, and those for the residences of the officials being incandescent. Street lamps and posts can be fixed up in the grounds, and portable lamps are provided for the stalls.

The slaughterhouse in Schönsee, West Prussia (fig. 56), is now fitted with acetylene gas from the public supply station in the town. According to a communication of the "Allgemeinen Carbid und Acetylen Gesellschaft-Berlin," the cost of the slaughterhouse alone would be from £47 10s. to £105, according to the number of jets

desired (25-100). To this would have to be added the cost of the meter and the pipes, which would depend on circumstances.

Before we discuss the *outfit* of the various rooms, such utensils will be mentioned as are used in all the rooms, and then those required only in the slaughterhouse proper. These are pails (best of wood, although those of enamelled or galvanised iron are used), brooms, and iron shovels. For the slaughterhouse proper, galvanised or enamelled iron pans for catching and holding the blood (small galvanised pails sometimes take the place of the former), and blood or refuse waggons are employed. These waggons, when made with a cover, serve for the reception of organs that are rejected. In the closely-fitting cover there is a revolving shutter which prevents the taking out of any of the refuse thrown in (fig. 14).

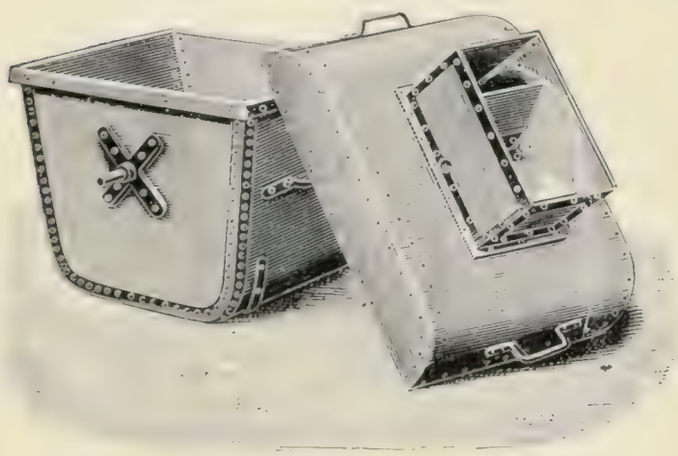


Fig. 14.

The spokes of the wheels of these, and also of the entrail waggons, are now made in two parts, so as to act as springs. It needs further experience to judge whether wooden wheels would be more practical for slaughterhouses.

The utensils made of wood should be branded with the slaughterhouse stamp.

Other necessary utensils, like knives, saws, cleavers, etc., should not be supplied for general use, as the misuse and the loss of such articles are too great, and the workmen ought to supply their own tools.

OUTFIT OF THE VARIOUS ROOMS.

In small establishments (fig. 2) the slaughterhouse for *large beasts* should occupy a quarter of the entire slaughter-hall, in medium-sized buildings one entire side of the hall (fig. 10), but in large places (fig. 19, Barmen) a special hall should be set apart. In all cases there should be rings fixed into the floor for holding down the animals' heads when they are being slaughtered. These rings, which should be ten feet apart, can be so fixed that the ring is on the surface of the floor (see fig 15), or countersunk in the floor (as in fig. 16). Both methods have their advantages and disadvantages.

After stunning the animal—the apparatus necessary for which is exhaustively treated in the appendix to this chapter—the next process is drawing the blood. Then the animal has to be skinned, and for this purpose is either pushed on to a movable stand made of wood (fig. 17, page 90), or laid on the floor in hollows formed like an animal's back, and made of granite, which discharge into the channels running down the length of the hall (shown in fig. 19, page 92, to the left of the foreground). The animal rests in this hollow (which serves at the same time for carrying off the blood), with its head towards the wall, so that the light falling from the windows lights up the interior of the carcase.

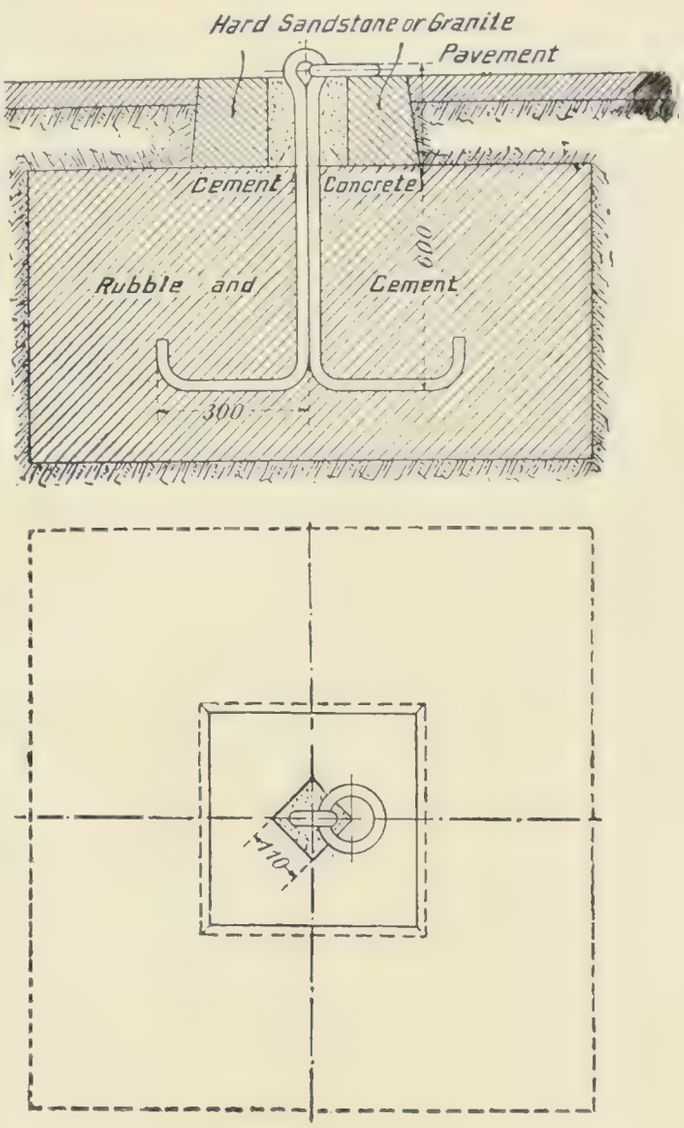


Fig. 15.

In order to properly skin and clean out the carcase, it is raised up by means of the crab, from which hang leg-trees or large gambrels Each of these crabs requires about twenty feet of floor space, so that by multiplying by the number of crabs the size of the space requisite for the large beasts will be ascertained (without counting the passage ways).

The old-fashioned crab served the purpose in earlier years, but it required too much exertion. A much better type is now used, which is easily operated, especially in the newest form with "twin drums," specially suitable for wire cable. According

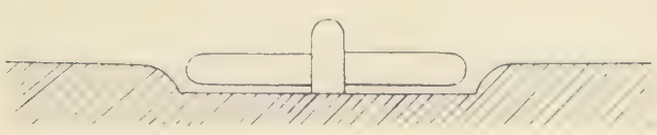


Fig. 16.

to the laying out of the halls and the division of the room, the trees hanging from the lifting ropes can be brought to a right angle, either diagonal or parallel to the middle passage. Fig. 18 shows such a crab, the gambrel of which hangs at right angles to the middle passage. The special advantage of these gambrels is that they catch the sides of beef automatically, which is not the case with the ordinary round pieces of wood, or "leg-trees." Instead of the hemp ropes, formerly used, wire ropes find more favour, and are

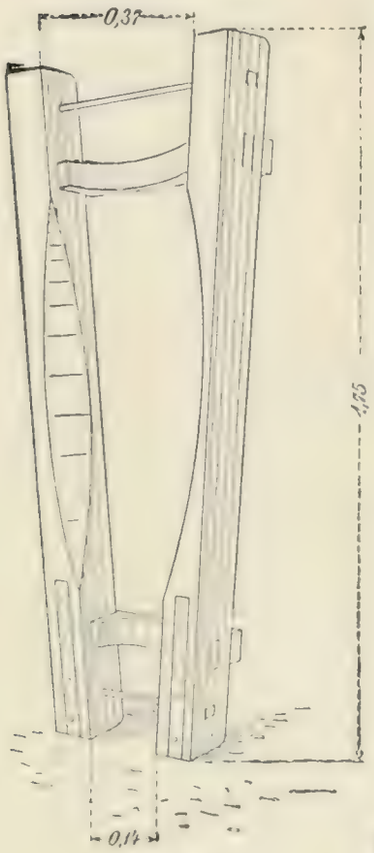


Fig. 17.

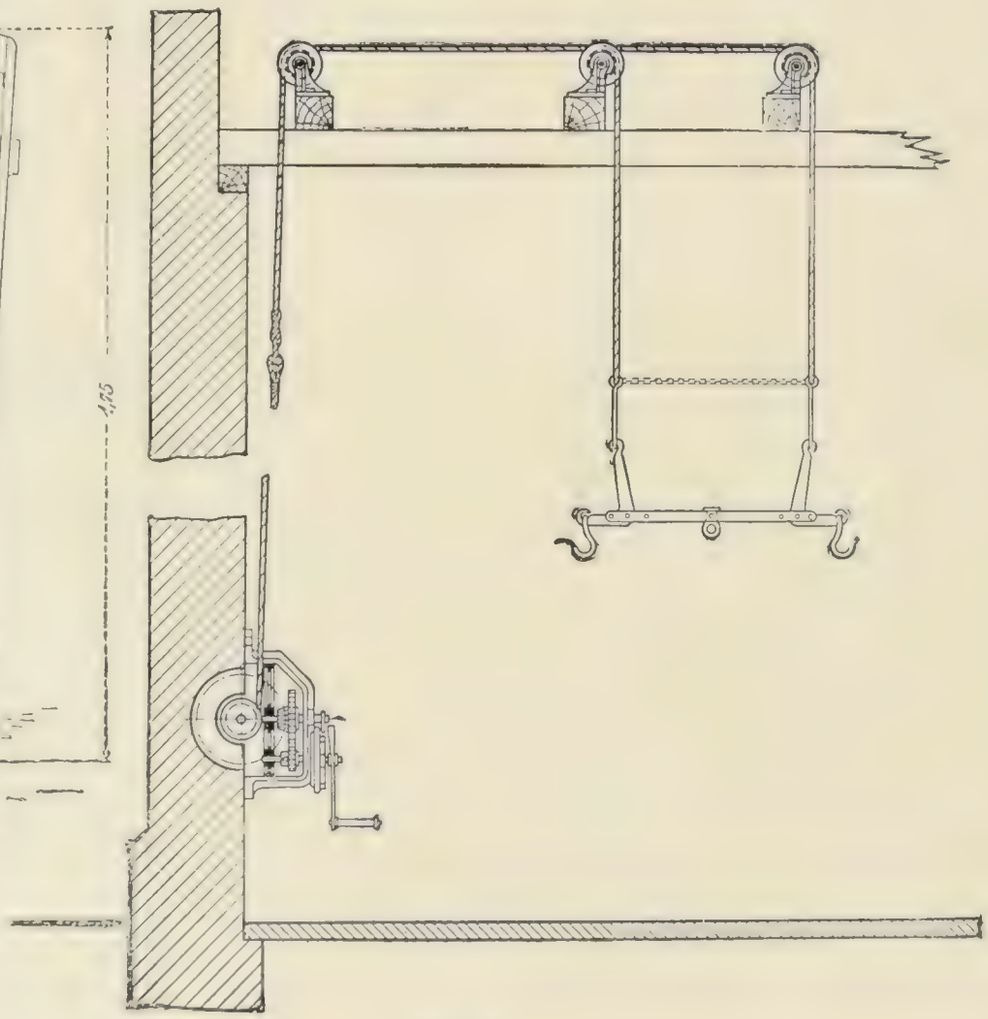


Fig. 18.

the cheapest in the end, because they are by far the most durable. A calculation as to the number of crabs required can be made thus: Every town of five thousand inhabitants will require four, and every additional three thousand will require one more. (This refers only to the fixed crab. Another kind will be described later.) By use of the travelling hook, to be discussed below, half the number of crabs would suffice. Each apparatus is usually numbered.

There are also many movable crabs in use, by means of which the meat may be conveyed to the opposite side of the building.

In smaller establishments there is sometimes very little room for these fittings, many of which, too, are not easily worked. The single crab can be replaced by no other. Its great advantage is its automatic gambrels, by which the two sides of the beast are drawn away from each other as they are hewn asunder—an advantage not possessed by the movable crabs. By the latter the animal can be conveyed to the other side of the hall after killing, and left there if desired.

Out of these movable crabs there has been developed the travelling hook, to be found in almost all new slaughterhouses, which offers the following very important advantages to public slaughterhouses:

(*a*) As the killing of large animals must always be done at the same time—that is, in one day—there must therefore be as many fixed crabs as there are animals killed, unless there are travelling arrangements, when each crab can be used five or six times in the ordinary killing time.

(*b*) If, then, these crabs can be used five or six times daily the slaughter-halls will be so much the more productive, or they will only, as is evident, require to be one-fifth to one-sixth as large as formerly.

(*c*) With the smaller size of halls the possible reduction in the cost of building is considerable.

(*d*) It is exceedingly convenient for the butchers not to have to carry the quarters of beef to the cold stores themselves, and it is also more advantageous for inspection purposes to keep the meat always in view, while the stealing of halves is more difficult than that of quarters, and the losses of drying are much less.

The advantages of such transport arrangements, then, are so great that they have been fitted up in older slaughterhouses, and should be fitted up everywhere when possible.

The oldest forms of this arrangement are so constructed that the halves of the oxen, hanging on wooden trees on overhead travelling hoists, can be conveyed to the other side of the slaughterhouse, and there lowered on to a pair of rails which run down the length of the slaughterhouse below the travelling hoist rails. On the rails there are specially shaped wheeled hooks with an arrangement for carrying the wooden tree with the side of beef suspended from it. By means of a forked rod this wheel hook is pushed under the tree, so that the

latter, when let down, falls on to the hook, and the side of beef can then be pushed into the cold room.

The following carrying arrangement has been fitted up in several towns: It consists of two levers fixed on one shaft and with a forked end, which slopes downward and picks up the tree, which rests on a pair of bearers. The levers are raised together and lift the tree from the trestles to a convenient position for carrying away.

The trestles lie at right angles to the course of the waggon rails,

Fig. 19.

and the waggon is pushed under their ends, the tree resting thereon; the forks are then lowered by operating a chain drum so that one of the prongs lies right under the uppermost edge of the trestle. Then the tree with the slaughtered animal hanging to it is pushed on to the end of the trestle until it lies inside the fork. The forks are now brought into an upright position. In the cooling room trestles are fitted up in the same manner as for the slaughterhouse, and the trees with the slaughtered animals hanging to them are laid thereon by again lowering the fork. This arrangement cannot, however, be considered very simple or handy.

The latest method of overhead transport is a considerable improvement on that previously employed, and in common with the old travelling gear permits of the animal being removed immediately it is killed; it is not raised as high as where single hoists are used because the carcase can be moved from the slaughtering place. The advantages of the movable hoist and single hoist are combined in the new method, the trees are more tightly grasped at both ends, and the troublesome lever arms are not used. It consists of a small iron

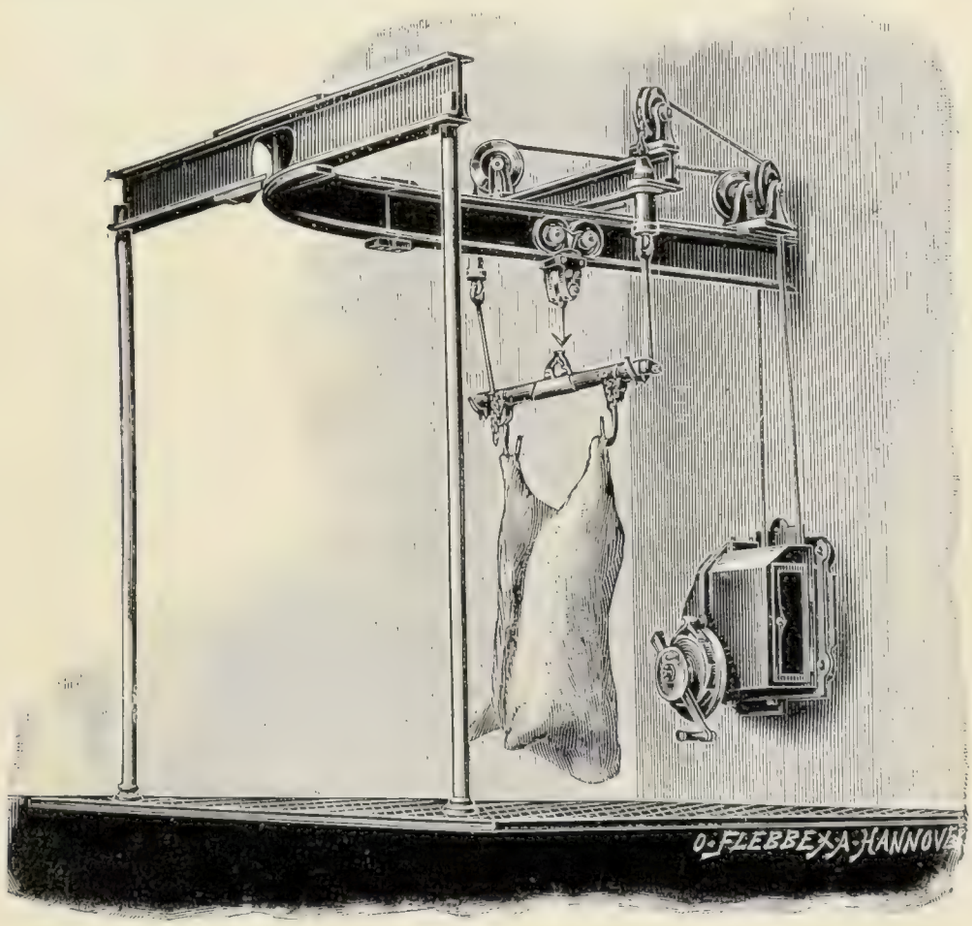


Fig. 20.

bogie with four wheels and two buffers, below which there hangs a double hook for picking up the tree on which the meat hangs. This bogie runs on the flange of a T girder as shown in fig. 20. It works as follows: After the hooks of the tree are inserted into the sinews of the hough of the half-skinned animal, the hooks of the hoist are let down far enough for the tree to rest in them, when the whole can be used as a stationary hoist (see fig. 21). If the carcase is to be raised on to the transport arrangement, the hoist raises it high enough for the hooks on the bogie to catch hold of the eyes in the middle of the tree, a forked rod being used to effect the transfer. Then the hoist hooks are slightly lowered, and the carcase

hanging from the bogie can be pushed along in any direction, as very simple switches can be arranged where required. The tracks from the stationary hoist all run into the main line leading to the cold store. If the hoists are ranged down two sides of the hall, it is advisable to lay a second line of track running parallel with the first. If the width of the slaughterhouse will allow it, two hoists can be fixed up one behind the other with a shunting track. When there is a great press of business *all* the hoists can be used, and afterwards only those next the wall, while those in front serve as hanging hoists.

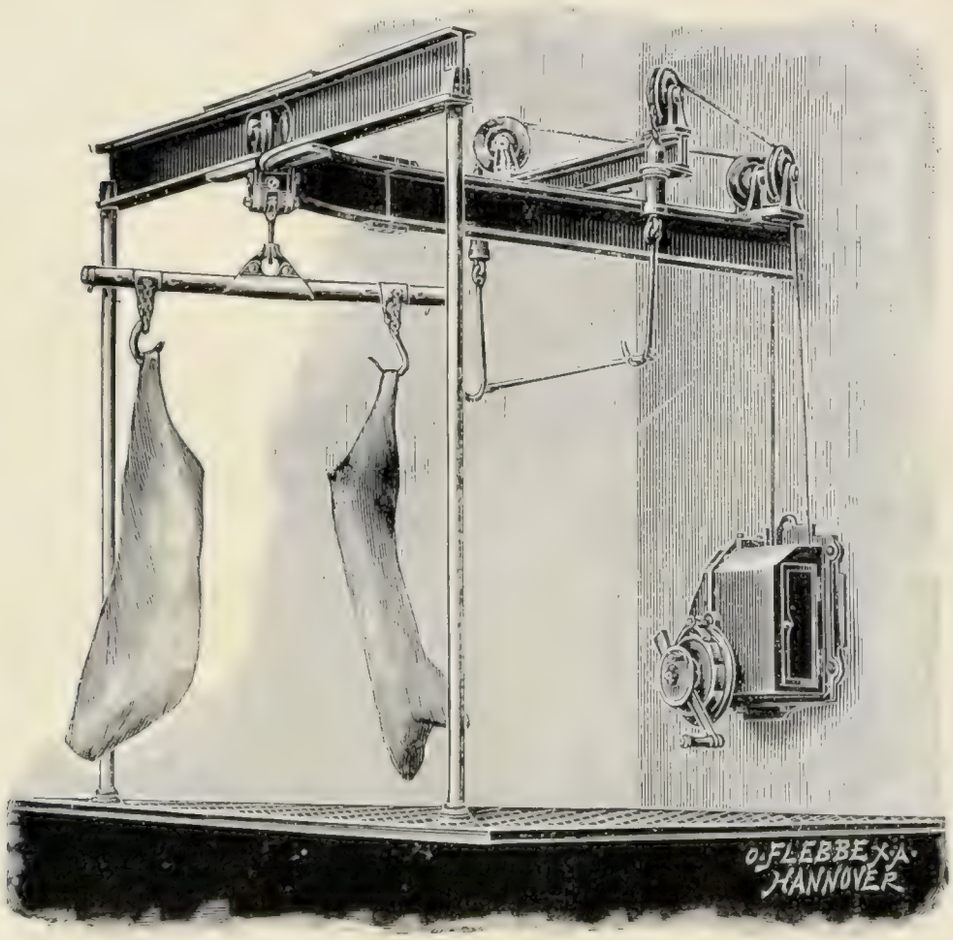


Fig. 21.

The same kind of hoists are provided in the freezing chambers, where the meat is deposited by similar arrangements.

Quartering is effected in the simplest and most convenient fashion if the halves are again hoisted, and the trees cannot tilt, as was possible in the old running crab system, as the tree is held fast by two hooks.

It may also be mentioned here that the tree hooks can be made to revolve, so that the halves of the carcase may be turned with the narrow sides to each other, to save space in the cooling and cold rooms.

The extremely moderate cost of this arrangement compared with its great advantages recommends it even for small establishments.

The transport arrangement invented by Alexander Hüber, of Cologne, is very similar to the above, but differs from it in the construction of the bogie track and switches. The rails are formed by two angle bars with a space between, through which hangs the hook for carrying the load. At the outer ends of the axle there are two larger wheels to act as a guide. As the waggon has only one axle it can run round the smallest curve, and when running over crossings one of the guide wheels is lifted as the bogie is pushed along, and when entering a branch at a crossing the bogie must be turned round by hand in the desired direction.

The hanging up and taking down of the sides of beef are managed in exactly the same manner as with the former construction.

The bogies of both travelling arrangements are also suitable for carrying pork by the use of one longer and simpler hook, with a projection behind for the purpose of fixing the point of the hook between the sinews of the hind legs.

The following three transport arrangements differ from those described above in that sides of beef are not carried by trees but by hooks fixed to the bogies, whereby only as many trees are necessary as there are hoists, and consequently the trees are not conveyed as dead weight into the cold room.

In the killing and transport apparatus constructed by Kaiser and Co. (fig. 22), the tree consists of a bar, which forms two inclined planes, meeting at the middle, on which are two little movable hooks. The hooks are held firmly at the end of the bar by two easily loosened lever catches. The animal, when killed, is hung on the hooks to be split down. After it is split in two the tree is raised higher, so that the ends of the levers knock the disengaging gear, by which the catches are freed. The movable hooks now run down both the inclined planes towards the middle of the tree, whereupon the bogie is pushed forward and picks up the sides. The track consists of I—iron, and the switches are bent out of one piece.

Another arrangement provides the tree-hooks with a shank and head projecting above the tree, so that the bogie can lift the hooks from the tree by means of a horizontal fork, which opens parallel to the roller track.

The only inconvenience of this mechanism is that each side of beef must be separately moved away, and therefore there must be a double supply of hooks, bogies, tracks, and hoists for taking down the meat.

Still another system is shown at fig. 23, page 97, where a track and a bogie are needed for *each* side of beef. The hooks of the tree

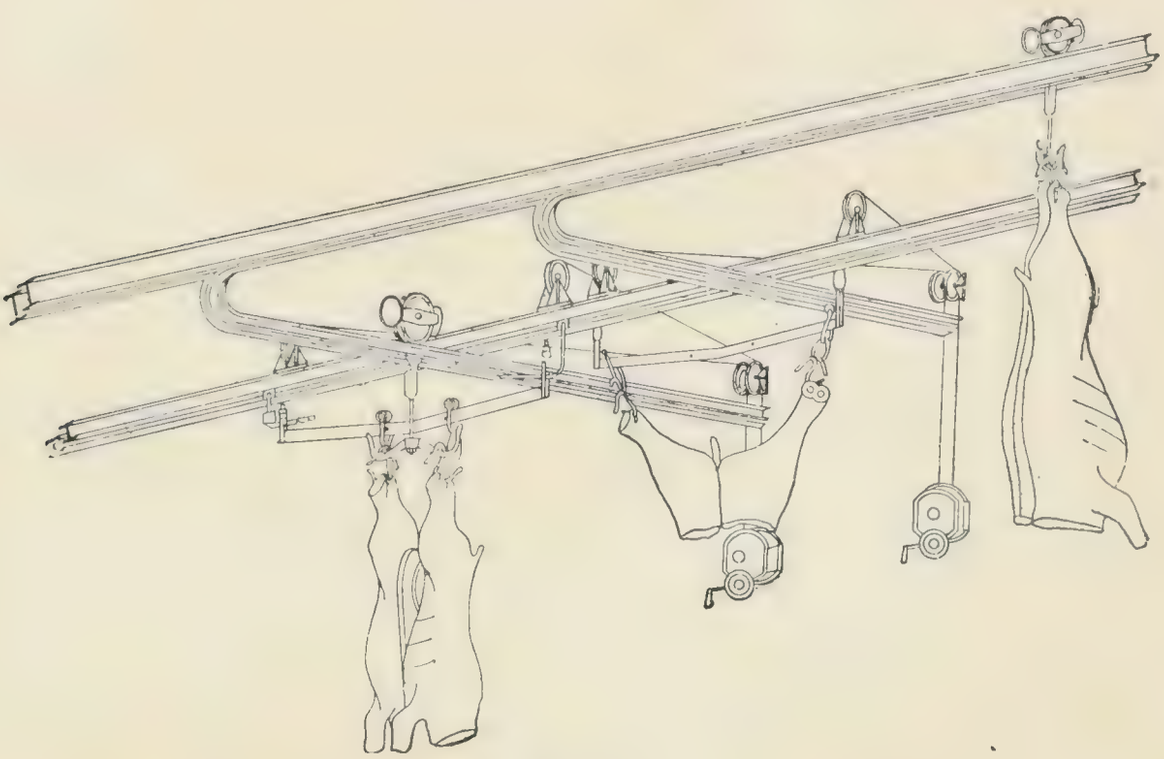


Fig. 22.

are fixed to the cross-bar, and on them hangs a double-hook with an eye, which serves for picking up the side of beef. As soon as the carcase is divided, it is hoisted until the eye is at the same height as a hook which hangs from underneath a bogie running on an I bar. The eye is then pushed on this hook, and as the tree is let down a little way, the double hook, with the side on it, disengages itself from the tree and hangs on the bogie hook. By a variation of this system, as shown at fig. 24, page 98, only *one* track is necessary.

Weighing Appliances should be selected to suit trade requirements, and must be a source of profit to the slaughterhouse. In some cases it will be convenient to use the ordinary steelyard, although it is preferable to employ some of the special forms of machines illustrated in figs. 25, 26, 27, 27a, and 28, pages 99, 100, and 101. It is advisable to keep all the machine above the floor, to prevent corrosion and damage. It is also

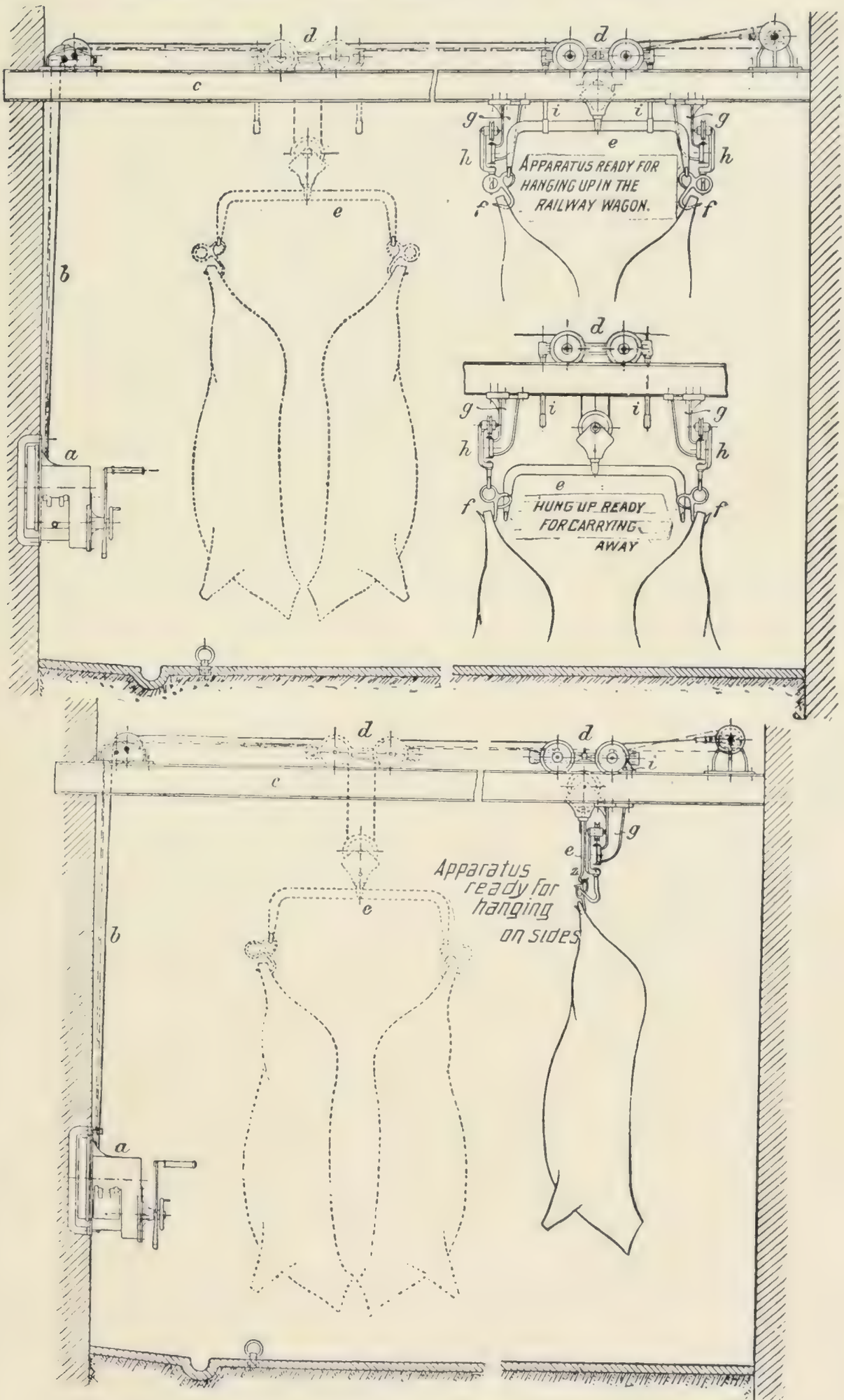

d
d
c
g
i
i
g
e
h
h
APPARATUS READY FOR HANGING UP IN THE RAILWAY WAGON.
f
f
b
e
d
g
i
i
g
h
h
e
f
f
HUNG UP READY FOR CARRYING AWAY
a
d
d
c
i
g
e
z
Apparatus ready for hanging on sides
e
b
a

Fig. 23

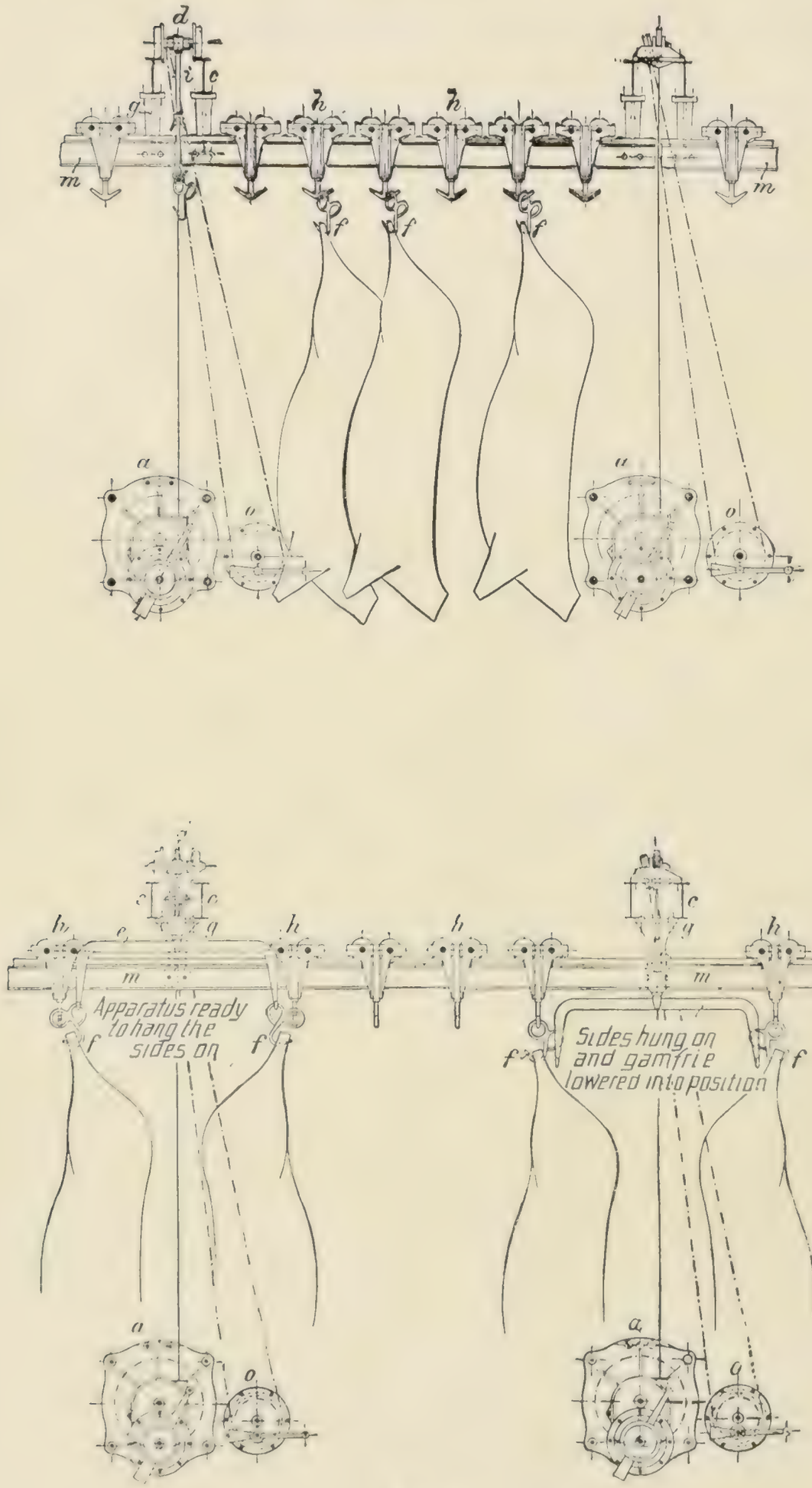

Apparatus ready to hang the sides on
Sides hung on and gamfrie lowered into position

Fig. 24.

advisable to fix blackboards in convenient positions for reckoning upon, so as to prevent scribbling on the walls and pillars.

In many slaughterhouses, particularly in the larger, there is a special tax levied for the weighing of meat, hides, etc., when an official weighing ticket is issued, and either a uniform price is charged for all kinds of articles weighed, or different rates for every variety of animal, etc.

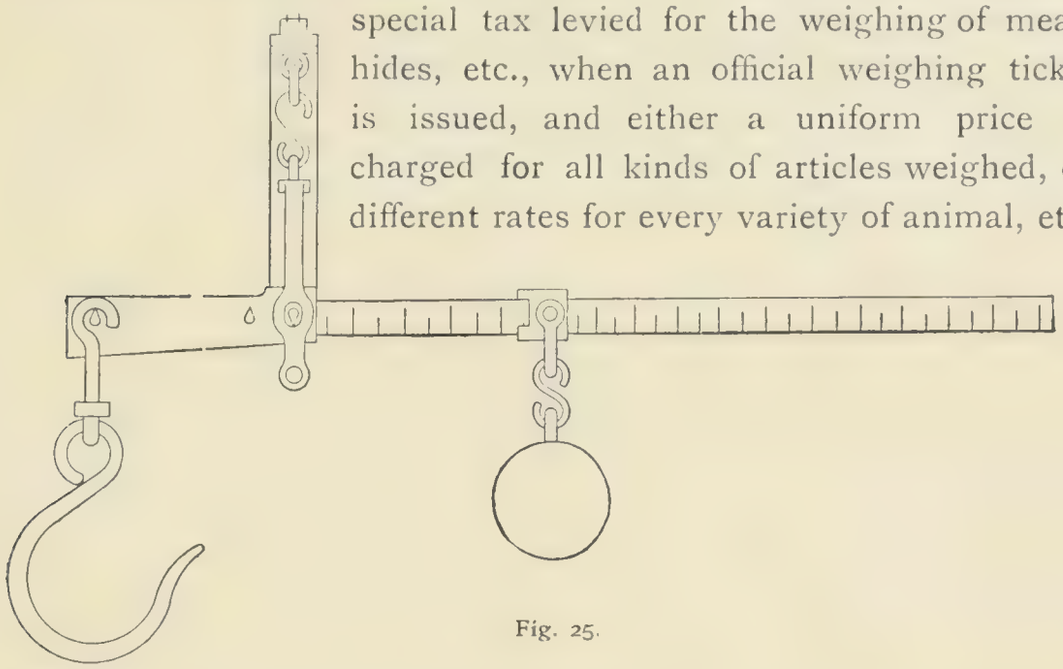


Fig. 25.

Waggons.—After the oxen are completely skinned and hoisted up, offal waggons are pushed underneath them, which serve for the reception of the intestines to be conveyed to the manure-house.

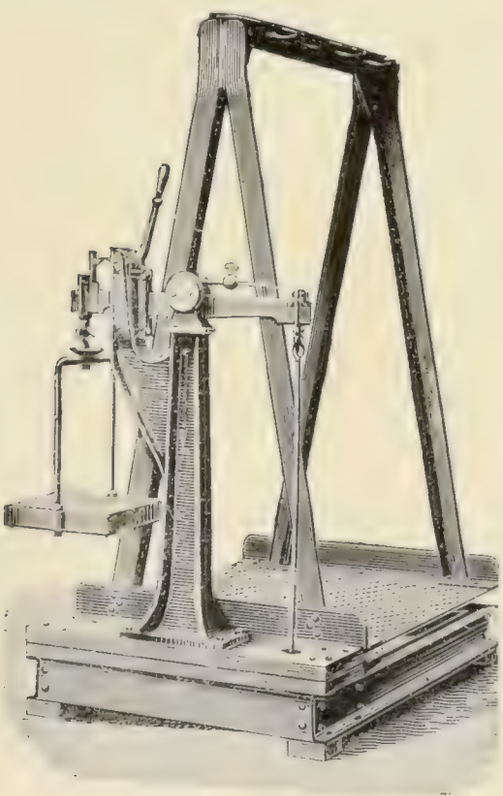
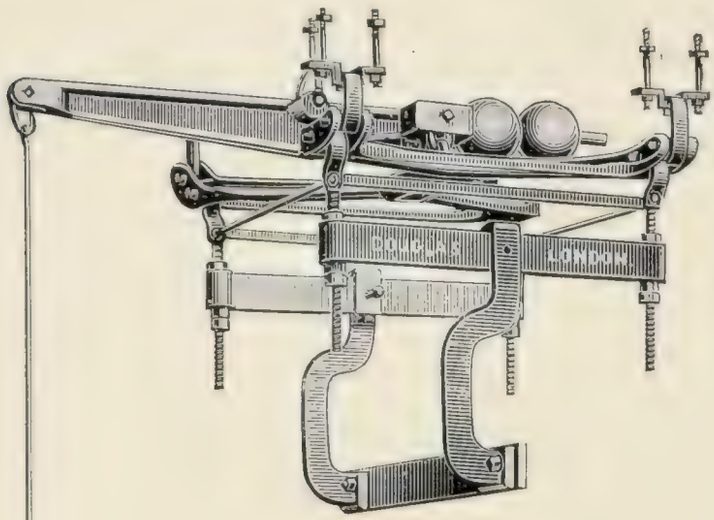


Fig. 26

For hanging up the inner organs, etc., hooks are fixed on the walls, and also on the pillars which usually run down both sides of the middle passage. They are fixed on the pillars in the form of hoops (fig. 29), either with double bands or with arms, which are fitted with hooks. A certain number of hooks should be marked as belonging to each hoist.

The Slaughterhouse for Small Animals occupies a quarter of the common slaughter-hall in small institutions (fig. 2), while one side of the common slaughterhouse is used for large and small beasts in medium-sized establishments, but a separate hall is reserved in large places (fig. 30, Leipzig.) Fig. 31 shows the end views of



DOUGLAS'S ABATTOIR
WEIGHING MACHINE.
(As used in the United Kingdom.)

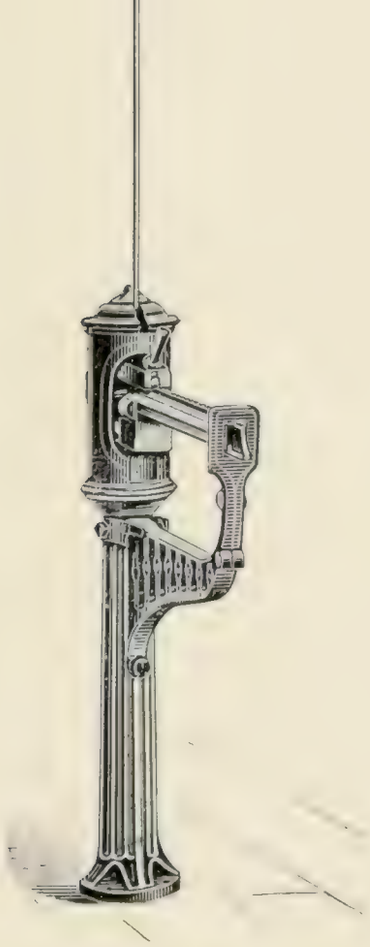


Fig. 27a.

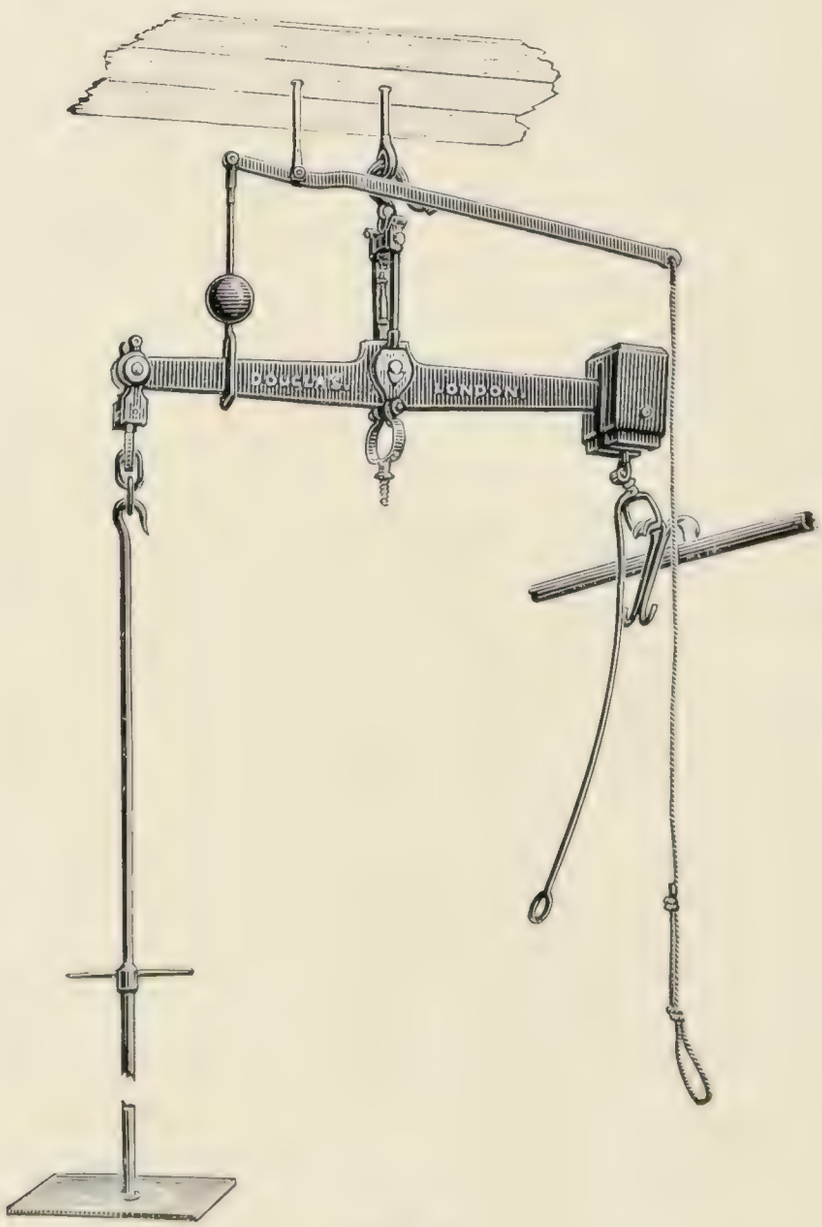


Fig. 27.

DOUGLAS'S PIG AND SMALL ANIMAL WEIGHING MACHINE
(As used in the United Kingdom.)

the small beasts', pigs', and large cattle slaughterhouses.) In slaughterhouses for small animals there are only trestles (killing blocks) and frames of hooks for hanging up the meat. The most popular of the former are illustrated in fig. 32,

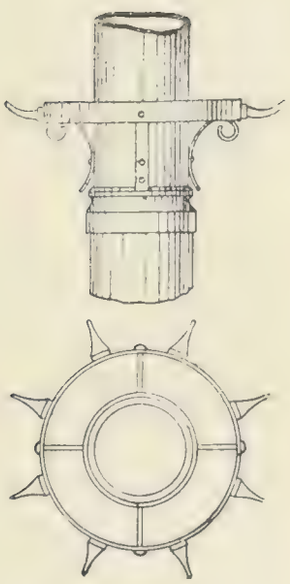


Fig. 20.

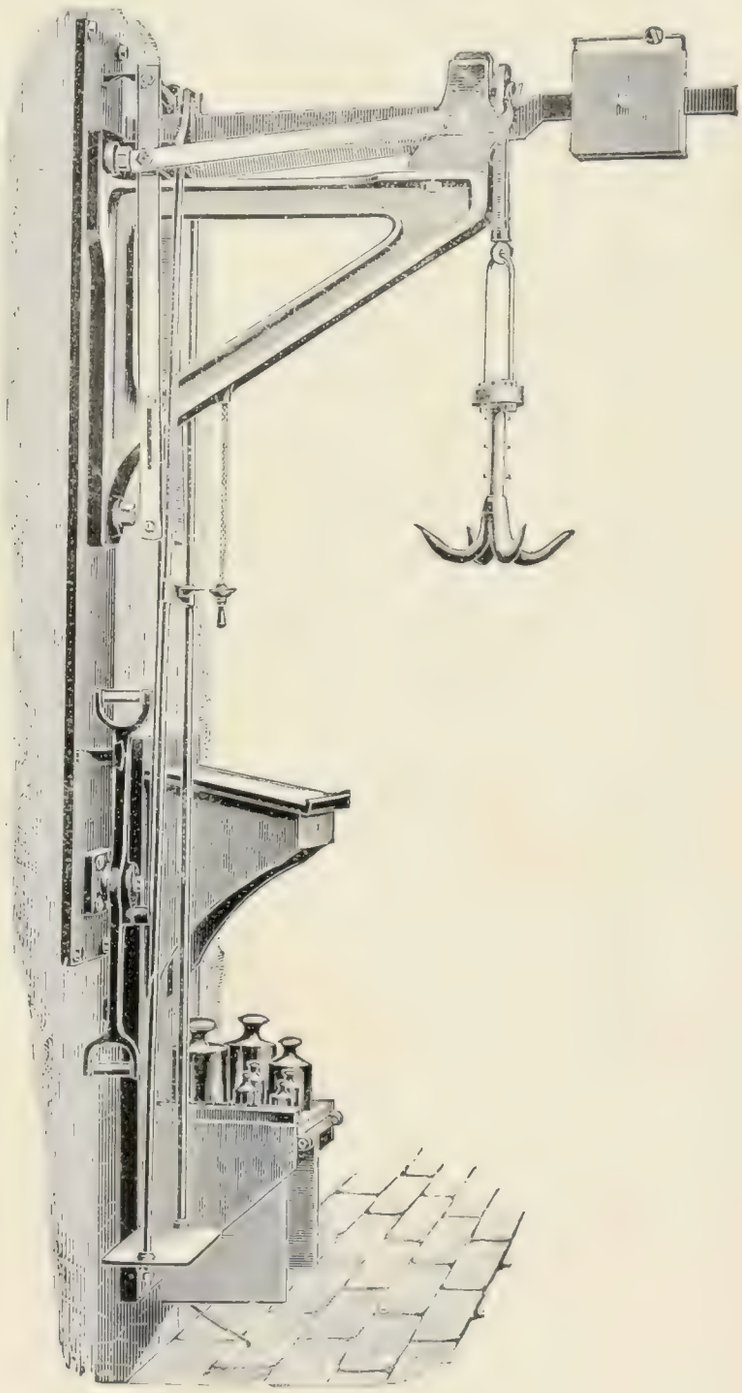


Fig. 28.

page 104. These are made of oak or ash, and well coated with varnish. Oak is not so suitable as ash. A piece must be cut out for the neck, as is shown in the illustration. Little trestles provided with wheels and a handle are much used in some of the slaughterhouses.

At Prague, the sheep while being bled are laid on blocks built into the wall and slanting to the front, where there are grooved gutters for carrying off the blood, so that the hall is kept clean, and very little blood is lost (fig. 33, page 104). When the animal is skinned it is hung on hooks, and afterwards the interior is taken out. The length of the hook frames, as mentioned in the descrip-

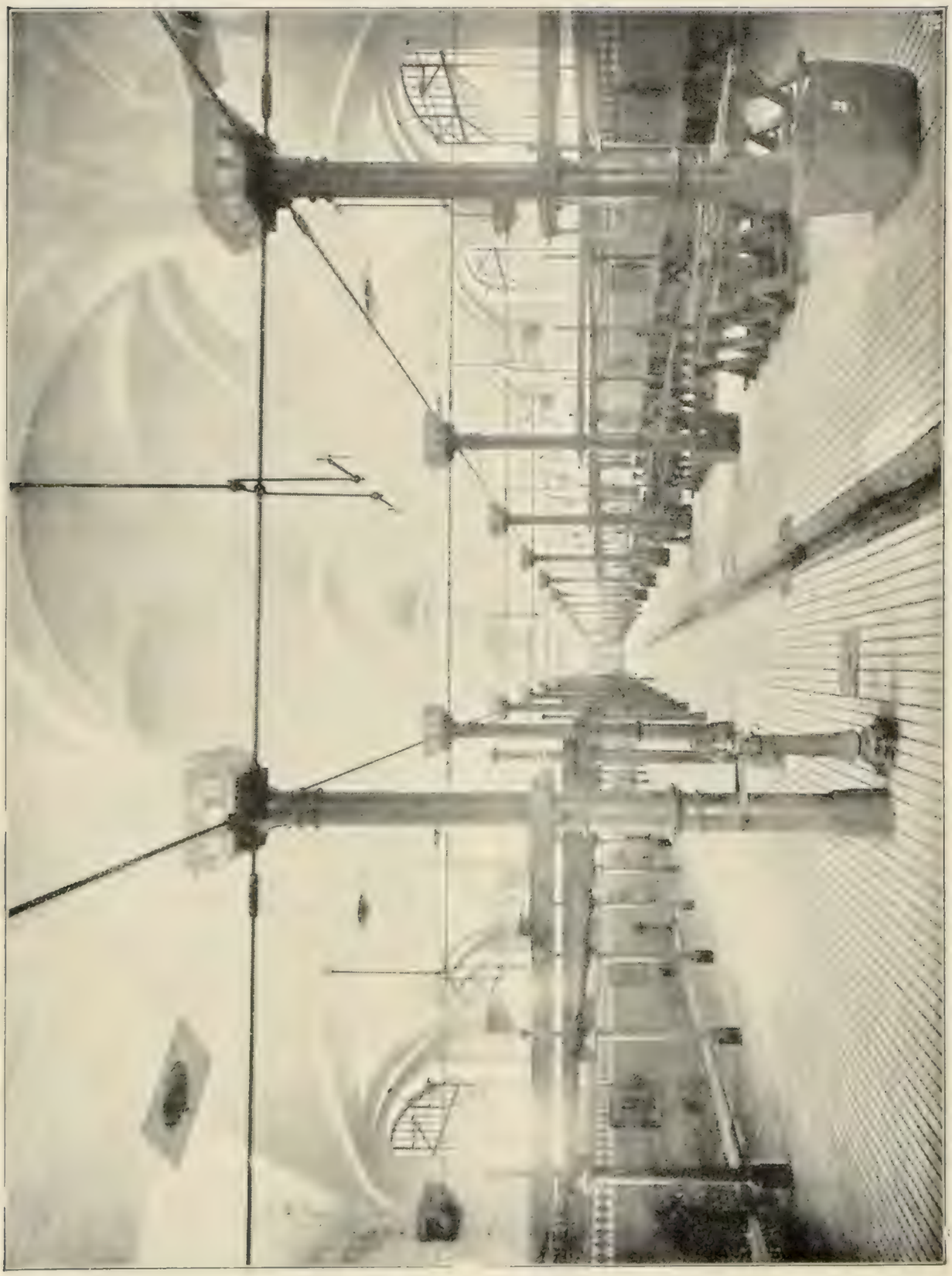


Fig. 30.

tion of the pig slaughterhouse, if killing takes place daily, must be twenty feet for every five thousand inhabitants. The two bars of the frame must be at least twenty inches apart, so that the animal can be worked at from the back. The frames should be about four and a half yards from each other, while the hooks ought to be one

Fig. 31.

foot apart, and about 6ft. 6in. above the floor. For each animal killed there should be a working space of three square yards.

In small slaughterhouses, where small beasts and pigs are killed in one room, arrangements are made whereby heavy calves and young cattle may be raised on to the hooks; of course in large slaughterhouses, where there is a special hall for this work, lifting appliances are always provided. Where small beasts and oxen are killed in one hall (see fig. 10, page 77), a short tree for young beasts can be hung to the middle eye of the large hoist tree.

Fig. 32.

Especial care is required in laying out and fitting up a slaughter-room for pigs,* whether it occupies the third and fourth division of the common slaughterhouse, or is in a special hall, as is the case in all the larger slaughterhouses. Fig. 34 shows the splendidly appointed slaughterhouse for pigs in Barmen.

The pigs are usually driven directly from their adjoining sties into the slaughter-hall. In larger institutions—especially in those where a direct connection between pigsty and slaughterhouse is not practicable or does not appear judicious, or where a cattle-yard with

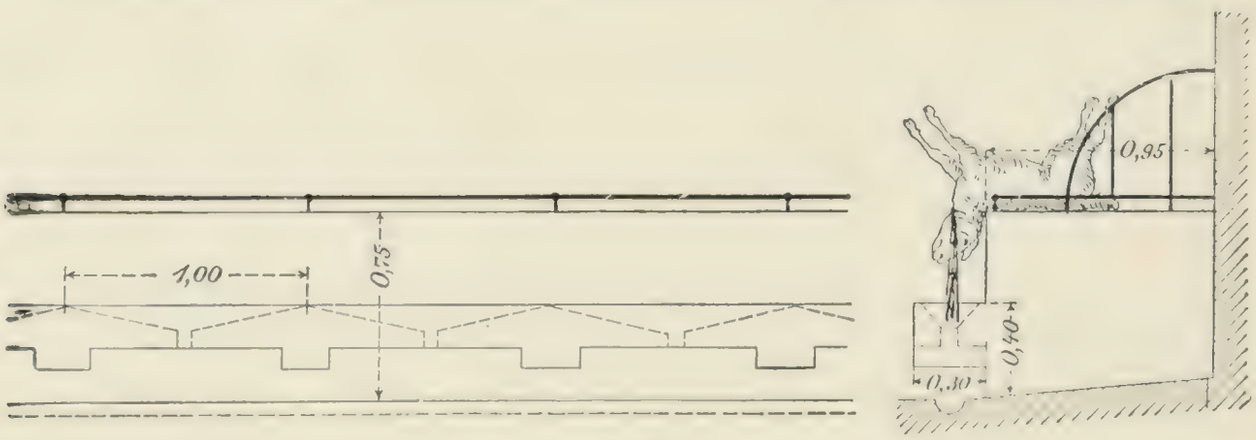


Fig. 33.

stalls adjoins the slaughterhouse—special resting places have been built on the outside of the hall. These are mostly roofed, and serve as a shelter for the animals (fig. 35, page 105, plan; fig. 36, side elevation of the pig slaughterhouse in Magdeburg), and are connected with the sties by narrow tracks (see also the chapter on Cattle-yards), while some doors give access from the waiting sheds to the hall. The sticking-pens, which in fig. 2 are

* See note page 107.

Fig. 34.

placed in the scalding-room, are surrounded with a low grating made of bars of iron or corrugated iron (fig. 34 on the left side, and fig. 35), and have a very inclined floor for draining off the blood. The door leading from those pens into the hall is counterbalanced and arranged to lift.

In Gotha the arrangements are not so satisfactory, as the sticking-pen is close by the sties, and the slaughter-hall is divided from these two places by a wide road, so that the pigs have to be conveyed across to the hall after being stuck.

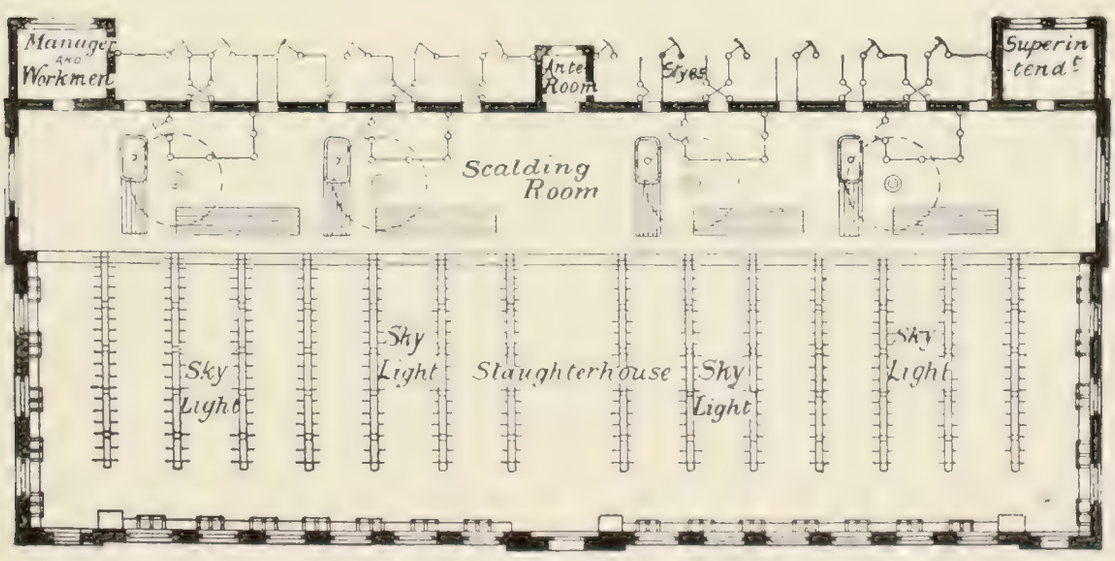


Fig. 35.

In Riesa there is a weighing-machine in the pigsties just at the door of the sticking-pen, through which all the animals must pass.

In the floor, or in the walls about 20in. above the floor, little rings are provided for binding the pigs. There are also hooks on the walls for the tools. After the blood-drawing is completed, which is best done on the floor,* the carcase is conveyed to the scalding-vat. This can either be done by means of a crane or a travelling hook. The swing cranes shown in figs. 34 and 37 are preferred to the wall cranes, but they take up a great deal of space. By the use of a travelling pulley (fig. 34 to the right) no special appliance for handling the pigs is required, especially if the track bars in the larger slaughter-room are led to the sticking-pen and over the vat. In larger institutions, where the slaughter-hall for

Fig. 36.

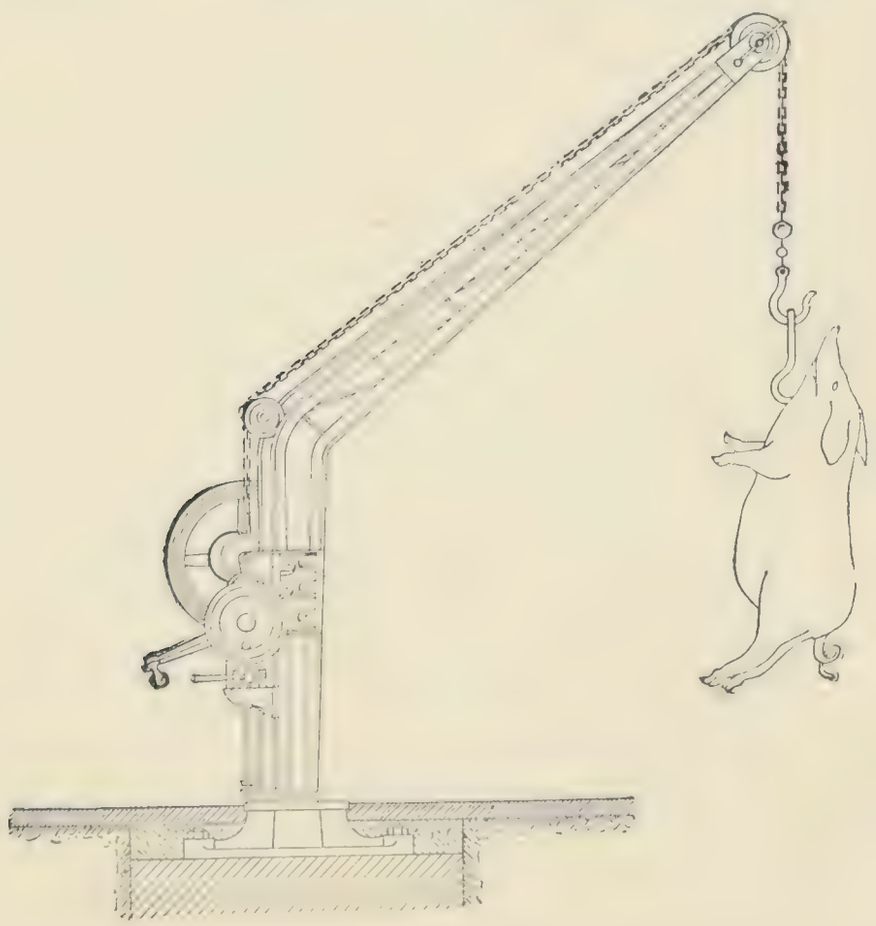


Fig. 37.

*This is contrary to the opinions of the bacon curers of Europe, who invariably stick the pig when it is suspended by the hind feet to an overhead track bar.—EDS.

pigs consists of three portions, one side being the sticking-room, the middle the scalding-room, and the third the offal-house, such an arrangement is strongly recommended.

To make it possible to take the animals out of the vat without any hoisting appliance, there are in some establishments rotatory wooden cylinders, about 3ft. long, put at the end of the vat, over which the animals can be drawn away.* (See appendix for other methods of killing.)

Instead of having only one hook at the end of the crane chain, there are often several (two to four), which are fastened into the lower jaw of the animal.

A ventilated scalding-tub has been introduced into nearly all the new slaughterhouses. For in winter the steam from the scalding-vat condenses by contact with the cold air, and becomes so heavy that it cannot be drawn upwards into the lighter air above, but settles in the lower portion of the room, and cannot be removed by ordinary ventilation.

The operations at the scalding-vats, where several people with sharp scrapers and knives are busily engaged, are thus rendered much more difficult, and it even becomes dangerous to work there. So that the formation of steam cannot occur, an inlet cowl is fixed outside the building with a pipe which discharges into the space below the scalding-vat. From here the air, warmed to about 10.)°F., goes towards the slot openings all round the tub, and escapes by these. The cold air drives warmer air upwards; but as it surrounds the whole of the vapour rising from the tub like a protecting wall, the latter is led up along with it before it has the opportunity of coming in direct contact with the air. To make this arrangement effective, there must be a hood over the vat, with an outlet pipe and

* This description of the method of slaughtering hogs in Germany is altogether contrary to the best practice in the United Kingdom. The method followed here is as follows: The pigs are driven one by one into an outer pen termed the "catching pen," and there are caught up by means of a chain forming a running noose, and which is portion of the rope or chain of a power friction hoist. This running noose is slipped over one of the hind legs of the pig, the friction hoist is put in motion, and the pig is instantly hoisted on to the sticking bar, where it is at once despatched by inserting a knife quickly in the direction of the heart and severing the main artery or aorta. When this is accomplished the pig is pushed along a confined space termed the "bleeding passage," and is allowed to hang there until all the blood has run out. It is then pushed on to a table at the end of the scalding-tank and the leg chains are removed. The pig is then thrust into the scalding-tank and kept there in water from 140° to 180° Fahr. according to the size of the pigs, until the hair comes easily away in the hand. The scalding-tank is fitted with a lever attachment and cradle, into which the pigs are pushed when sufficiently scalded, and tilted on to the "scuttling table," where they are scraped clean. For bacon purposes they are singed in a vertical singeing furnace after this, but such an operation would only be carried out in a bacon factory, not in a public abattoir.

cowl above the roof, and there must be special heating coils in the lower part of the vat.

The greatest cleanliness must be observed, so that the dirty water which runs over the edge of the tub is drained off the floor, and does not penetrate into the heating space below. Likewise, arrangements must be made so that the people working at the tub are in no wise injured by the hot air proceeding from it.

In summer the ventilating shaft serves to cool and ventilate the whole room, and water-pipes are fixed in its inner surfaces at different heights, or the circulating air can be cooled by allowing water to run down the walls of the air well. This cold air falls downwards, because of its heaviness, into openings in the wall of the room, while the foul hot air is borne upwards through the shafts by means of the ventilating cowls.

The distance from the top of the vat to the lower edge of the hood is usually about five feet, and there are two openings, so that the end of the crane jib can enter the casing.

To accelerate the movement of the steam, the exhaust from the steam engine has been utilised to warm the air, which streams out into the hall from several openings, over the floor, and disappears with the steam through the ventilators. This method of carrying away the vapour is most efficacious.

Oblong vats are more commonly preferred than the round type, and they are made to take as many as six pigs at once. As seven or eight minutes are required to scald each pig, forty-eight may thus be scalded in an hour. All scalding-vats must have the bottom sloping to the middle, and be fitted with gully and grid for carrying off the foul scalding water.

The water for scalding can either be brought to the necessary temperature of 145°—150°F. by direct steam heating, or the warm water is made to rush in by means of the "counter-current" apparatus already described. To keep the water perpetually at this temperature, it is necessary to have a small quantity of hot water constantly running through the apparatus, which is regulated by an overflow pipe. The workers at the vat are spared a great deal of time by the automatic regulation of either method.

By means of the mechanism already described the scalded animal is raised from the scalding tub to the scuttling table, where the hair is scraped off.

In America, where they kill pigs and make them into pork in the shortest possible time in great numbers, pig-scraping machines have been constructed. By means of an endless chain, the pigs hanging on a hook are raised out of the vat after scalding and drawn through the scraper, which is horizontal. This consists of knives arranged in a circle, which are fastened to strong springs, and are pressed by the latter against the animal. Some of these knives are shaped like masons' trowels, others are round in front, others, again, are heart-shaped, each according to the shape of the part of the body to be scraped. Water rushes in upon the body, out of thirty half-inch holes, to wash away the hairs. By means of an automatic mechanism, the cleaned animal is drawn out of the machine and rolls on to a steep incline. In *one* minute eight pigs can thus be cleaned. And all is beautifully done. It is impossible to damage the meat by this process.

A machine of the same kind has been constructed by Weir and Craig, of Chicago. This is fitted up in a strong wooden column, about 13ft. high and 4ft. 9in. in circumference. A pig is cleaned in this machine in five or six seconds. A scraping-machine (Lowry scraper), which occupies less room, is illustrated in the catalogues of William Douglas & Sons, Ltd., of Putney, London ; it consists of a ring of elastic arms, through which the pig is drawn. The scrapers are fastened to these arms. A cross-shaped shower-bath removes the bristles, etc.

Before the construction of these scraping-machines, round steel brushes were in use, which turned on their axes, and the pig attached to the chain was drawn through the brushes, which were set narrower or wider according to the shape of the pig.

In fig. 38 there is a representation of the killing of pigs and bacon curing in the Union stockyard of Chicago, from the moment that the animals are brought by means of a lift to the sixth storey of the building to be killed, and finally, after going through a process in every storey, are ready for curing in the cellar.

In the German slaughterhouses, there are various arrangements for scraping, such as movable scraping-tables, and if these are used the pigs when cleaned are carried on them to the frames, where the hooks are fixed. Then there are stationary tables, where there are other appliances (movable hoists, etc.) for carrying the pigs over to the hooks. These stationary scraping-

tables should be long and supported by iron trestles, while the top of them should be either of arched sheets of perforated galvanised iron (fig. 39) or of strong planks of wood (fig. 34). The upward arch causes the skin to be tightly drawn, and so expedites

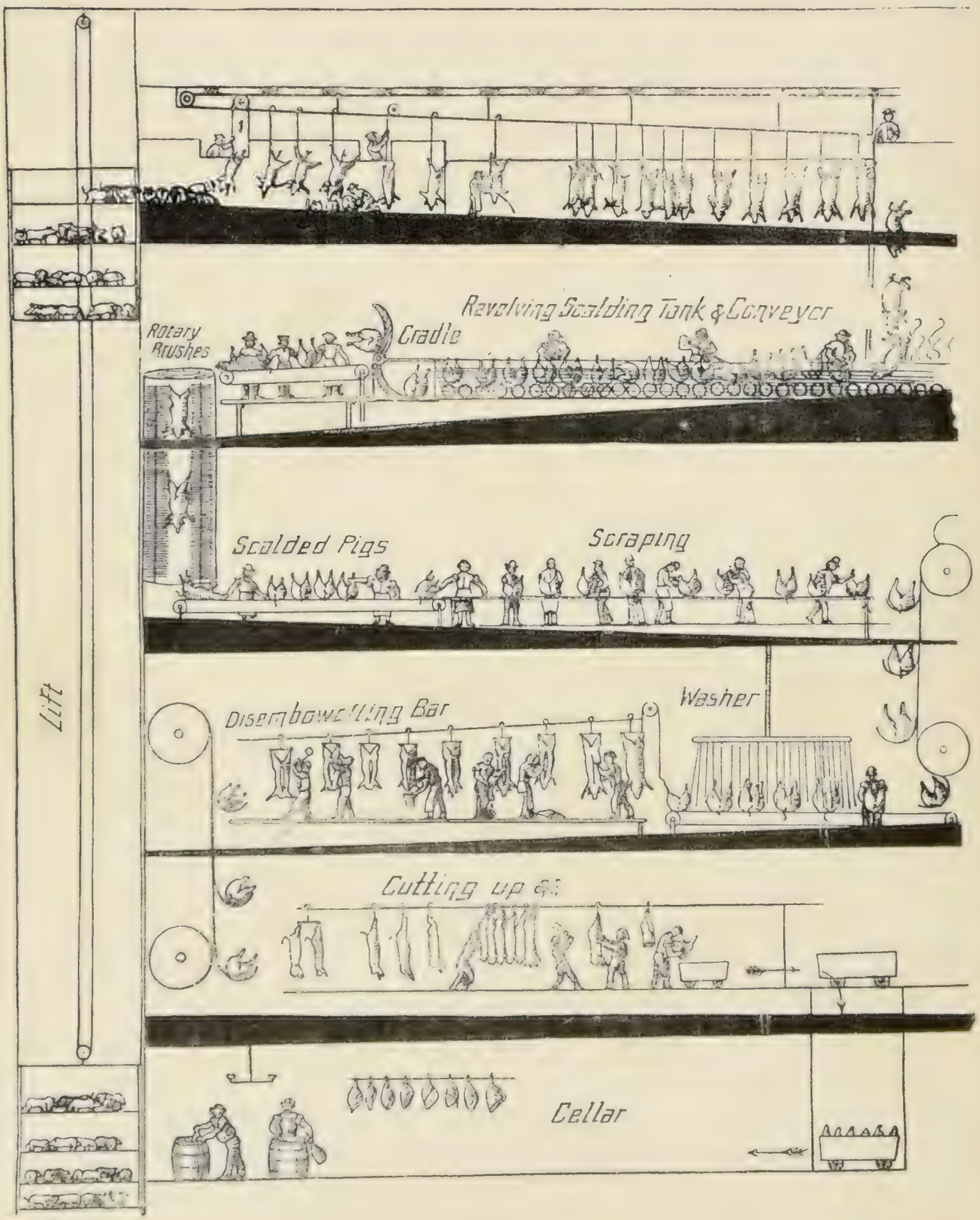


Fig. 38.

bristle-removing. The travelling hoist, which has already been mentioned several times, the arrangement of which, and also of the hook frames, is shown in fig. 34 (right side), consists of broad wheeled frames which run on rails, and which again form rails for a small wheeled frame. On this little frame hangs a pulley block and tackle, the end hook of which serves for picking up the pig. It is possible, by means of this arrangement of pulleys, to effect movements in all directions and to hang the animal on any hook with perfect ease.

The hook frames in the slaughterhouse for pigs differ from those in the slaughterhouse for small beasts, in that there is a second row

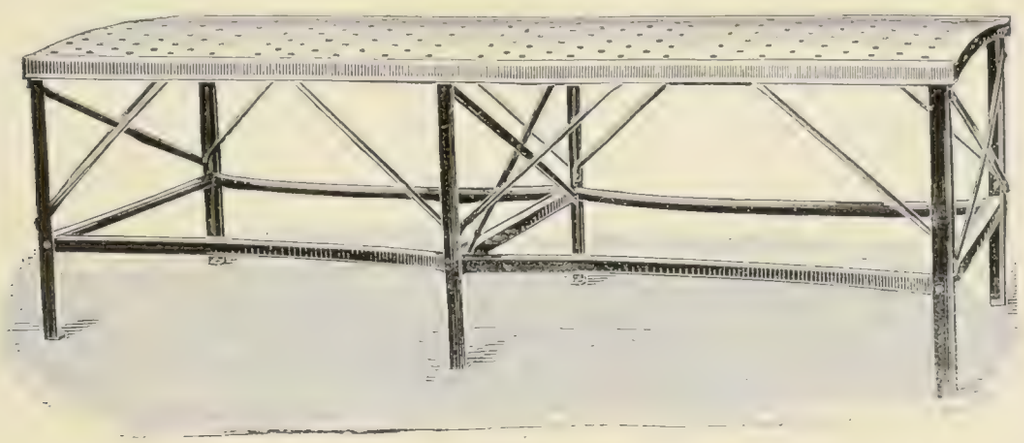


Fig. 39.

of small hooks behind the larger ones for hanging up the "plucks" and fat. If there is very little available space, and the hook frames are in consequence not only perpendicular but also parallel to the wall, they must stand out from it far enough for the animal to be worked at from the back. The hooks should be 6ft. 6in. above the ground and 12in. apart. Every three of these should be numbered. The length of the hook frames, of which 3ft. 3in. is reckoned for each pig killed, should be 30ft. for every 5,000 inhabitants. The hook frames should be 13ft. apart. It has been found practical to fix up some hooks even as high as 8ft. from the ground, so that the heads of especially large pigs do not lie on the floor. To prevent small pieces being thrown on the floor, there should be some large tables standing against the walls; it is also advisable to have some large tubs or tanks for washing the bloody portions, and to prevent a waste of water.

(For the various killing appliances, see appendix to this chapter.)

The Manure-house and the Tripe-house.—The roofs of both of these rooms should have plaster ceilings. The inner appointments of the

manure-house are mostly very meagre, but the greatest care must be exercised in properly covering the walls and floor as well as ventilating in the place. In any case it is a great mistake to make the manure-house a simple platform without a roof, as is often the way in small institutions. Even a roof alone is not sufficient, but the room must be perfectly protected from wind and weather.

As we have already seen in the description of the removal of the manure, there is a choice of methods in the laying out of a manure-house. Whether a manure-pit is attached to it or whether the movable waggons stand underneath, there must be openings in the floor, by which the manure falls into them. Of course these openings must have covers, trap-doors, etc. If the two-wheeled waggons are placed behind the manure-house, there must be a shoot which leads to the waggon from an opening in the wall fitted with a door. These shoots can be made of slate or iron ; wood is not so suitable. The same arrangements are made if the manure is emptied into special railway-trucks, as previously described.

In the manure-house there should be a tub in which the entrails are washed after being emptied of their contents. Over these tubs screw-nosed cocks are provided for cold and warm water. Large washing-troughs, made of boiler-plate, should be clear of the floor or wall, resting only on feet to avoid the collection of dirt of every kind.

In some slaughterhouses these tubs are made of moulded cement, but they are difficult to keep clean on account of their rough surface, and have the drawback that the water running down below flows directly over the feet of the workmen employed. Care should be taken that all tubs have a drain, that the draining gutter in the floor be alongside the wall, and have a raised rim at one edge (see fig 40, transverse section).

The real cleaning and scalding of the entrails are done in the offal-house. This room also requires care as regards walls, floor, and ventilation. The floor must have a very good gradient and the walls can only be kept clean if the best material is chosen as regards smoothness and durability, such as glazed bricks or tiles. Oil-paint or porcelain-enamel is not advisable, because the walls are so often spattered with particles of fat, and can only be cleaned with hot water. Further, all crevices and corners must be avoided, otherwise particles of fat and organic

matter will settle in them and become putrid at a high temperature. The small tables and troughs against the walls (supplied with taps for hot and cold water) should also be of a smooth material, and either fixed absolutely close to the wall or with a wide enough space behind them for the removal of any particles that may have stuck fast. Glazed earthenware is frequently used for tables and troughs, as fig. 41, the bottoms of which must be sloped slightly to the waste. These are, of course, very easily and thoroughly cleaned.

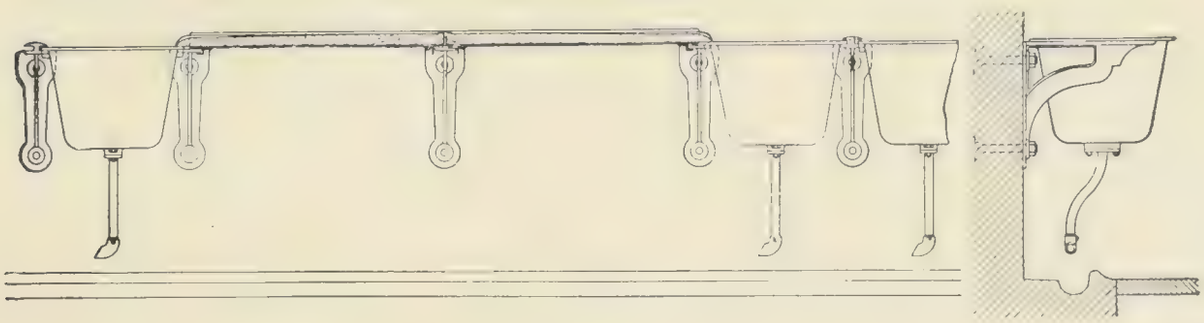


Fig 40

Opinions as to the durability of this material are much divided. Some think that in winter the fat sticking to the skins cools so easily when brought near the cold clay that it is almost impossible to take it off the skins. The same may be said of the galvanised iron tables, surrounded with a little rim about half-inch in diameter, used for the same purpose. "Fat removing" tables are made with a flange all round (see fig. 40). Formerly these flanges were of wood, but dirt, etc., soon gathered in the fissures.

Instead of each table being supplied with separate cocks for cold and hot water, the previously mentioned mixing cocks are much used.

To prevent the running to waste of hot water, self-closing lever cocks can be had, which must be held down by the hand while the water is being drawn.

The walls of the tripe-house should be fitted up with one or several rows of hooks, particularly over the table, so that the parts cleaned will not be hung on the water-taps or the gas-brackets.

The tripe-scraping tables should be of wood with a raised edge (about threequarters of an inch), and with an outlet at one corner. The tops should be half covered with corrugated iron plate, on which to scrape the paunches. Very useful and durable, and therefore strongly recommended, are the tables shown in figs. 42 and 43. A vessel for the reception of the scrapings should stand below the tables beneath the oulet.

Ventilators should be placed over all the scalding-tubs in the tripe-house, as well as in the pig-scalding room; great care must be taken in having the whole room thoroughly ventilated, as each rinsing-trough, when used, creates steam and damp.

The articles to be scalded can either be held down with common

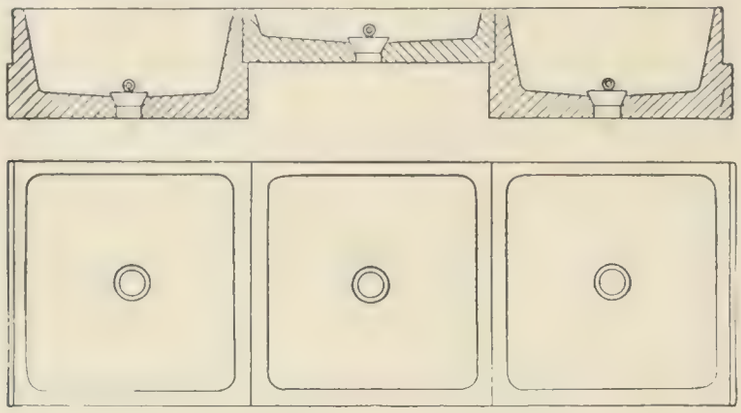


Fig. 41.

forks with several prongs, or by a more convenient appliance. For instance, there should be a pillar in the middle of the trough, with chains, from which hang a number of perforated zinc pails, each to hold about one and a half gallons, and by which the articles to be scalded should be lowered into the water (see fig. 44). Common scalding-tubs, provided with scalding-pails hung on broad hooks, are often used (see fig. 45, page 116). The tripe-scalding boilers are also provided with special partitions for this arrangement.

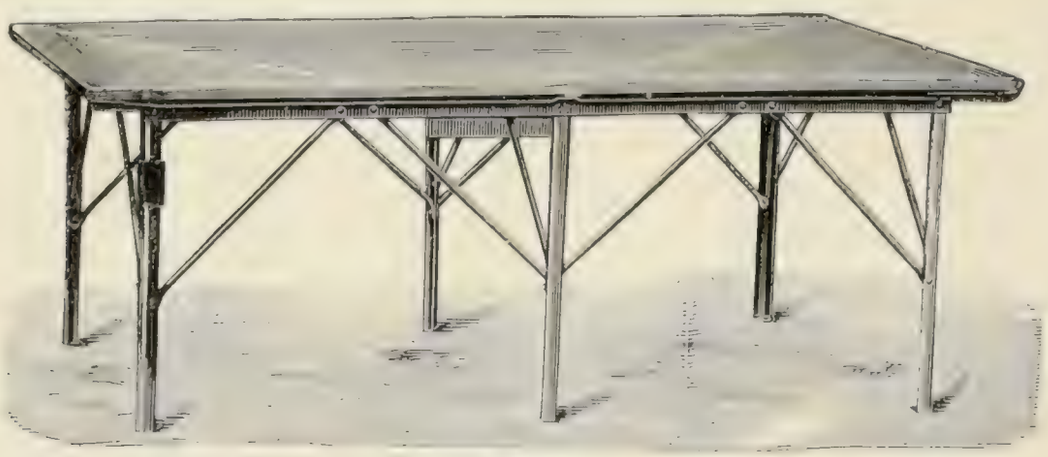


Fig. 42.

In the tripe-house there is also a wooden block, on which the hoofs of the scalded feet are broken up, otherwise it will be done on the corners of the troughs or tables, which would soon be destroyed by such treatment.

In a number of the large slaughterhouses, and in several medium-sized establishments also, there are fittings for emptying and

cleaning the intestines in the pig slaughterhouse itself (see fig. 54; ground plan of the pig slaughter-hall in Magdeburg). The latter arrangement is, however, not to be recommended, on account of the numerous drawbacks connected with it.

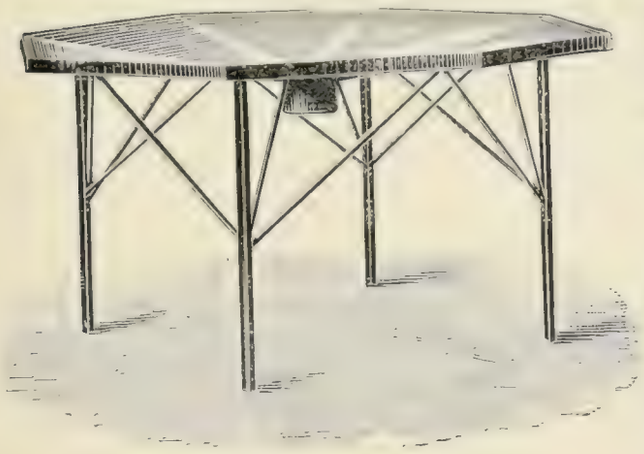
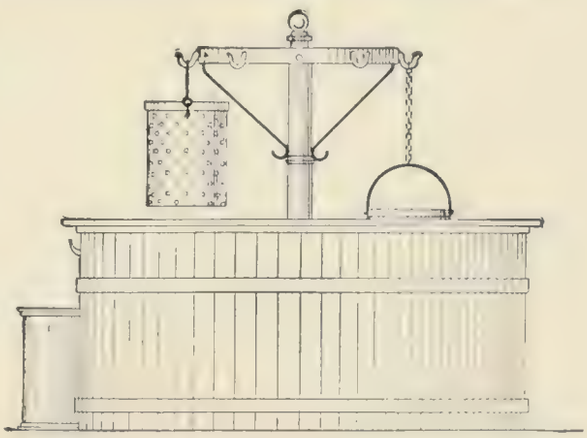


Fig. 43.

To prevent the workers employed in the warm vaporous air being subjected to draughts, screens of corrugated iron should be fixed up inside the tripe-house doors perpendicular to the wall.

The Lairage.—The lairs, as we have seen, are erected directly alongside of the slaughter-hall in small establishments, but in the larger institutions are separated from it by a cart road. These must be amply supplied with light and ventilation. The latter is attained by means of movable sections in the windows, and air-flues of wood, cement, or sheet-iron in the vaulted roofs, which are all supplied with cowls. The walls, and more especially the floors, must be covered with a water-tight and easily disinfected material, and so must the racks, feeding-troughs, and partitions. The former are best made of cement and glazed tiles. The same can be used for the feeding troughs, although these are often made of galvanised iron.



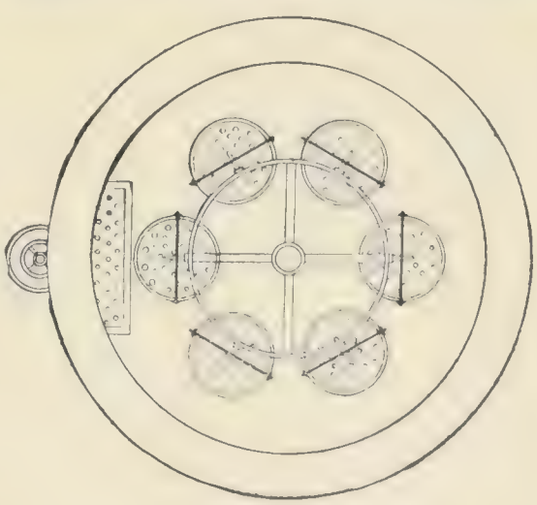


Fig. 44.

The drain-pipes for the ox-stalls can be of half glazed earthenware pipes, about sixteen inches wide, and left open. These stalls should be separated by partitions sixteen to thirty-three feet apart, so that dry fodder can be supplied in suitable portions. The fodder

troughs (description of which will be given in Chapter XIV. on Cattle-yards) should have iron sides which draw up and down, so as to prevent the throwing out of the fodder.

The water troughs must be easily filled with water by a tap for the purpose, and should have a slight fall from the side at which the water enters; on the opposite side there should be an outlet for the dirty water, supplied with a cock.

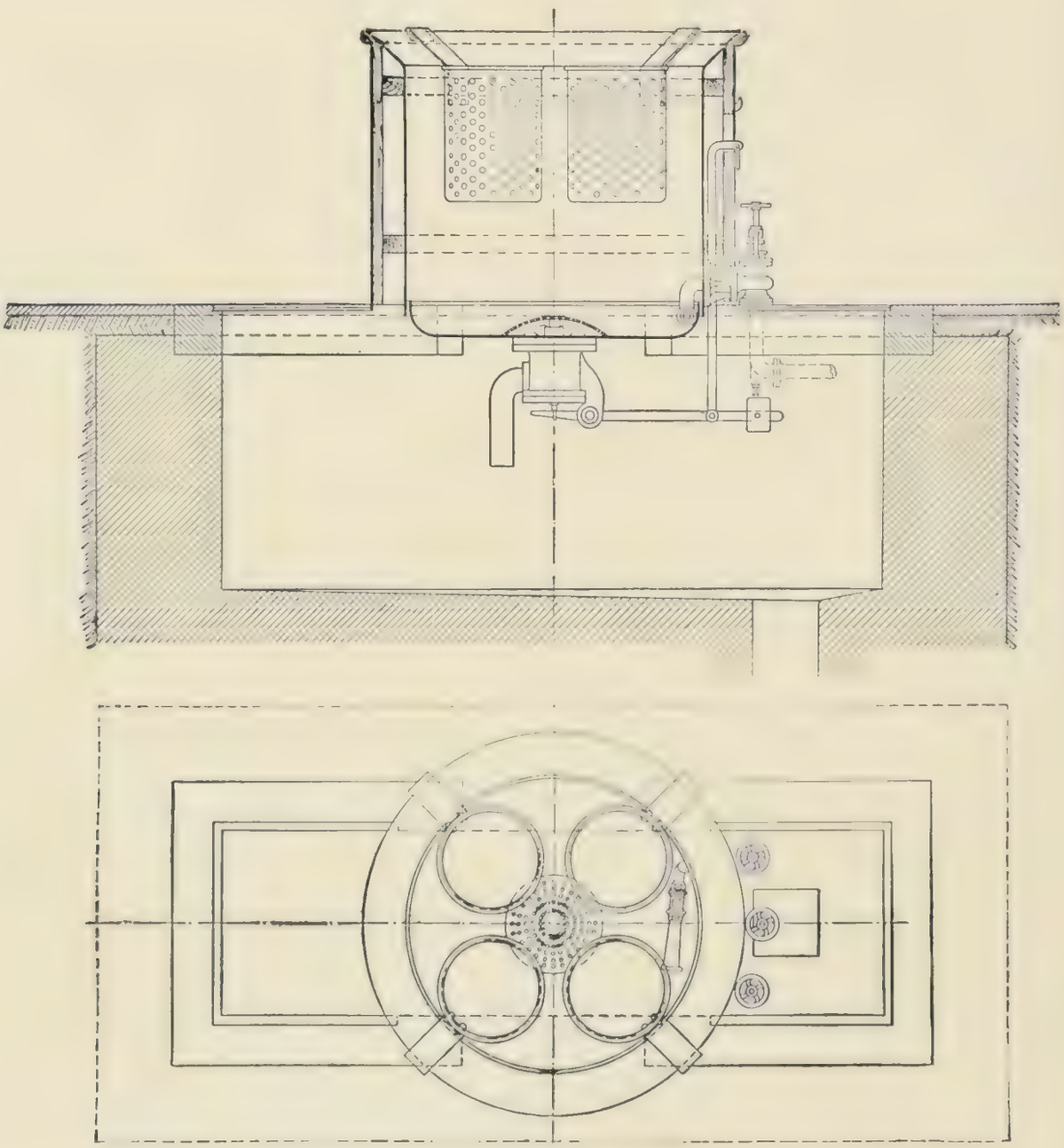


Fig. 45.

The troughs nearest the walls should have iron racks. In the ox-stalls there should not merely be rings for binding the cattle, but halter chains should also be provided, specially strong chains being fixed for bulls and restive beasts.

Space should be provided for twice as many animals as are killed on an average daily, and for every animal fourteen square feet should be allowed. That includes both passage and stall.

In the stalls for *small beasts* and in the pigsties, the partition walls should be of iron (either iron rails or corrugated sheet), bricks (laid in cement), or solid concrete—*never* of wood. In the pigsties the doors shown in fig. 46 are commonly used, as the animals can only go the desired way. Doors running on small wheels, and with a simple adjustable fitting, are made as fig. 47.

For pigs, and also for small beasts, twice the amount of accommodation should be provided compared with the average number of animals killed daily, allowing eight square feet for each pig, and five and a half square feet for each small beast, exclusive of a footpath about 3ft. 3in. broad.

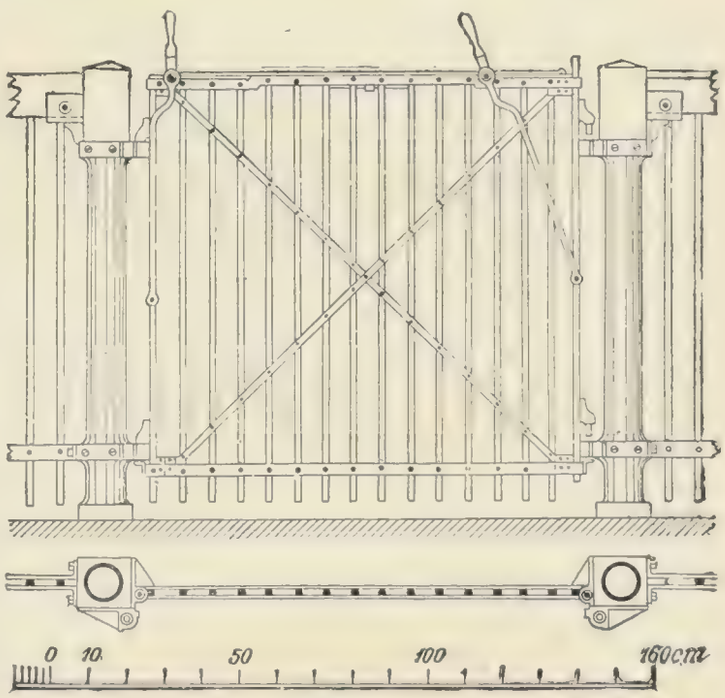


Fig. 46.

As animals are often sent in during the absence of the butchers, and are not always marked, it has been found advantageous to have the stands and stalls numbered, and to have blackboards or slates provided in each stall, on which can be marked the number, sender, and name of the receiver. The animals can also be distinguished by marks (see Chapter XIII.) or by tattooing (see Chapter XI., No. 2).

The Journeymen Butchers' Room.*—If there is not a special room where the butchers take off their outdoor and working clothes, with necessary hooks for hanging them up (as is the case in large establishments, where such a room is under the inspection of an official), there must be in the general butchers' room several cupboards, with lock and key, and with doors of finely meshed wire,

* In Germany every butcher must serve a definite apprenticeship, and procure a certificate of competency., like any other tradesman.—EDS.

so that the contents are safe, but yet have sufficient ventilation. There must also be appliances for washing. These basins may either be fixed to the wall or they may stand in the middle of the room. They should be emptied simply by lifting them up. In the next chapter (Chapter IX.), the advantages of large baths in these rooms will be discussed.

In large establishments appliances for washing the vessels and

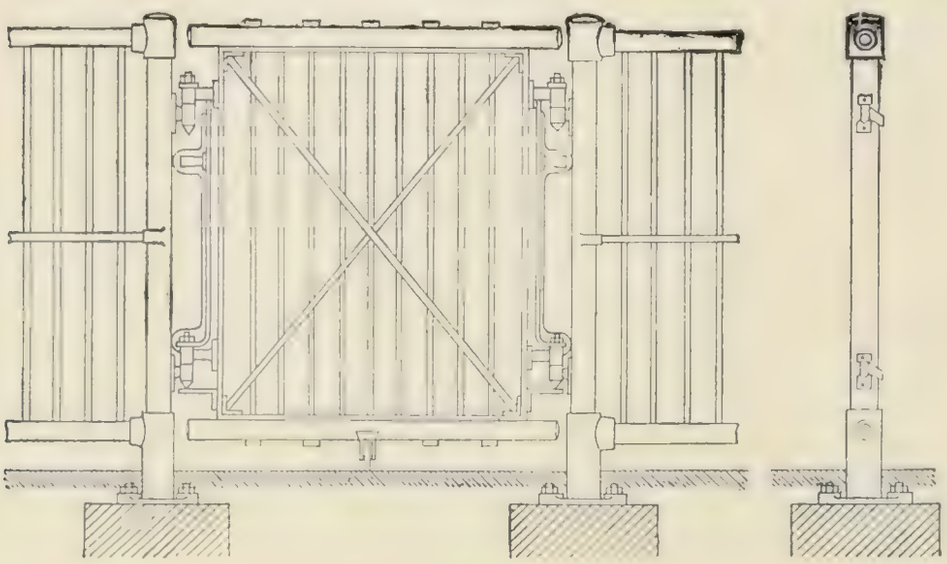


Fig. 47.

cleaning the tools are placed in the slaughter-halls, and are generally troughs of glazed earthenware, about 28in. long, 20in. broad, and 20in. deep, fixed upon four low pieces of granite.

The Police Slaughterhouse.—Apart from all the other buildings lies the police or sanitary slaughterhouse and the hospital-house. It usually consists of one room, and is fitted up for killing every kind of animal, with hoists, hook-frames, appliances for scalding, etc. The hospital stalls adjoin it. Both of these must be so fitted as to be easily and thoroughly disinfected (see Chapter XIV. on Cattle-yards.

The Condemned Meat Room.—If meat, on inspection, is found unsuitable for human consumption, it is, according to the circumstances of the case, objected to either finally or temporarily. Until a final decision is made, or until it is destroyed, it is kept in the custody of the slaughterhouse authorities. If there is a cold-room, a special room for this purpose can be added to it (see figs. 2, 10 and 55). If there is no cold-room, a small room should be reserved for this purpose, in as cool a part of the building as possible, unless the generally little used hospital slaughterhouse is employed.

In any case the room must be clean, and walls and floors must be of a water-tight and easily disinfected material. It is recommended that every slaughterhouse be provided with such a room.

In fig. 48 is shown a very practical portable dissecting table, for use in the condemned meat room.

Estimates of the Cost of Building Slaughterhouses.—This chapter will not be complete without some remarks as to the cost of building a slaughterhouse.

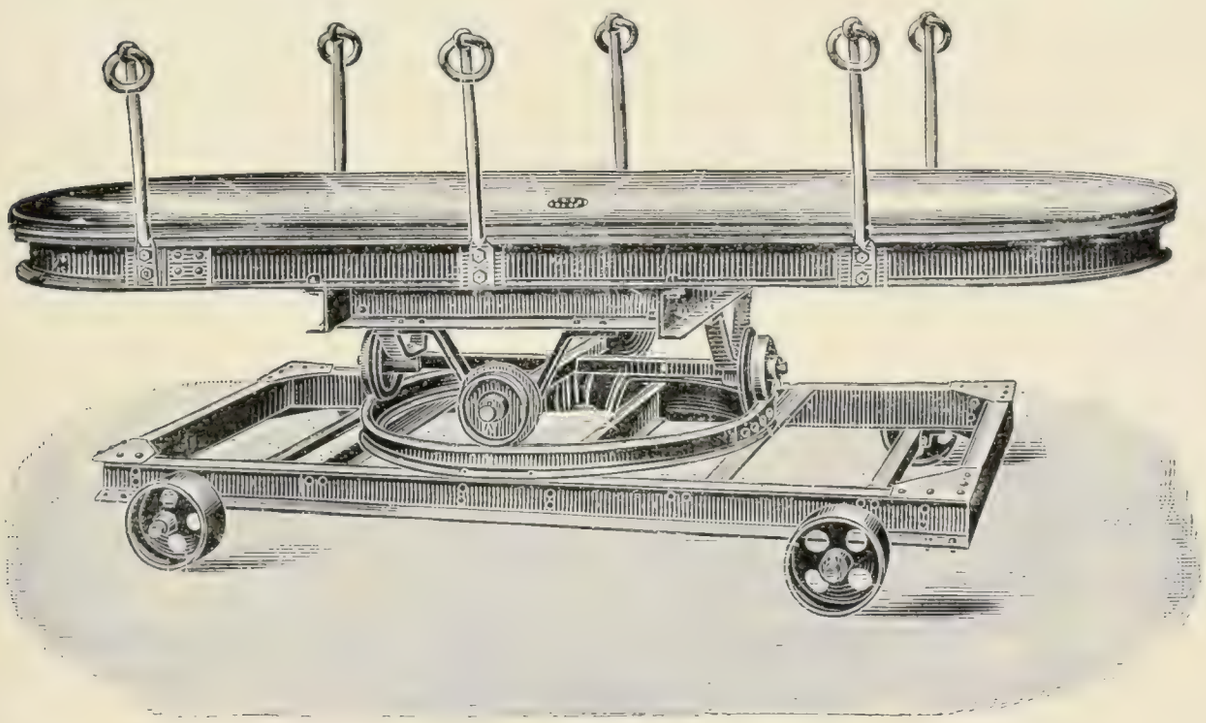


Fig. 43.

According to Osthoff a slaughterhouse costs as a rule—(*a*) Without a cold store, seven or eight shillings per inhabitant; (*b*) with a cold store, ten or twelve shillings per inhabitant.

DESCRIPTION OF VARIOUS ESTABLISHMENTS OF WHICH PLANS OR ILLUSTRATIONS ARE SHOWN.

Osthoff has prepared a table showing the detailed results of his calculations. He has curtailed the expenses as much as possible, and perhaps his averages are *too low*, although there are a number of slaughterhouses built at even a lower price. But these latter are primitive establishments. The list on the next page of sixty slaughterhouses in different parts of Germany shows that the average per head of inhabitants is 11·7 shillings without a cold store and 15·4 with a cold store. On page 121 a list of different *large towns* in Europe which have a cattle-yard in connection

Inhabitants of the town.	Cost of the slaughter-house without a cold store. M.	Number of refrigerating machines.	Cost of the cold store with cold chamber. M.	Total cost. M.	Cost per inhabitant: of the slaughter-house without cold store M.	of the cold store with cold room. M.	of the whole slaughter-house. M.
5,000	40,000	II	20,000	60,000	8·00	4·00	12·00
6,000	48,000	II	20,000	68,000	8·00	3·33	11·33
7,000	52,000	II	20,000	72,500	7·50	2·86	10·36
8,000	60,000	IIa	25,000	85,000	7·50	3·13	10·63
9,000	67,500	IIa	25,000	92,500	7·50	2·78	10.28
10,000	70,000	IIa	25,000	95,000	7·00	2·50	9·50
12,000	84,000	III	34,000	118,000	7·00	2·83	9·83
15,000	112,500	III	34,000	146,500	7·50	2·30	9·80
18,000	135,000	IIIa	42,000	177,000	7·50	2·33	9·83
20,000	160,000	IIIa	42,000	202,000	8·00	2·10	10·10
25,000	200,000	IV	62,000	262,000	8·00	2·50	10·76
30,000	240,000	IV	62,000	302,000	8·00	2·07	10·30
35,000	280,000	IV	62,000	342,000	8·00	1·77	9·97
40,000	320,000	IVa	82,000	402,000	8·00	2·05	10·38
45,000	360,000	IVa	82,000	442,000	8·00	1·78	10·11
50,000	400,000	IVa	82,000	482,000	8·00	1·64	9·90

Town.	Inhabitants.	Building capital. M.	Cost per head. M.	Town.	Inhabitants.	Building capital. M.	Cost per head. M.
Apolda*	21,000	360,000	17·1	Oeynhausen ..	2,500	25,000	10·0
Arnsberg .. .	7,000	79,650	11·0	Oppeln*	15,750	138,418	8·2
Bütow	5,000	50,724	10·1	Pforzheim* ..	30,000	350,000	11·7
Château - Salins	2,100	20,000	9·5	Potsdam* ..	54,000	773,000	14·3
Christburg ..	3,100	30,000	12·5	Prenzlau ..	18,000	170,000	9·4
Cleve*	10,000	204,000	20·4	Radolfszell ..	2,400	38,000	15·7
Eisenach* ..	21,000	345,000	16·4	Rappoltsweiler	6,000	54,000	9·0
Erlangen* ..	20,000	300,000	15·0	Ratibor	19,400	160,000	8·3
Eschwege.. ..	9,800	105,500	10·7	Rawitsch ..	12,400	190,000	15·3
Freising	9,730	151,373	15·6	Riesa*	12,000	250,000	20·8
Gerdauen	2,860	24,000	8·4	Rosenberg ..	2,900	26,200	9·0
Gladenbach ..	1,300	24,000	18·4	St. Johann* ..	14,600	200,000	13·8
Gotha*	29,000	540,000	18·6	Schlawe.. ..	5,500	91,713	16·6
Greifswald* ..	20,300	233,000	11·4	Schönsee .	2,000	21,350	10·7
Grottkau	4,500	50,500	11·2	Schubin.. ..	3,050	28,190	9·2
Guben*	30,000	550,000	18·3	Schwiebus* ..	10,000	116,000	11·6
Guhrau .. .	4,500	70,000	15·5	Sensburg ..	3,560	30,000	8·4
Jarotschin ..	2,900	45,857	15·8	Siegen	18,300	215,000	11·7
Insterburg i./P.*	20,740	280,000	13·0	Spremberg* ..	11,000	175,000	15·9
Isny	2,500	30,000	12·0	Stolp*	22,450	282,000	12·5
Koburg	16,200	216,700	13·4	Stuhm	2,260	24,000	10·6
Kurnik	2,470	27,500	11·0	Sulz (O.-Els.).	4,444	60,000	13·5
Kreuzburg ..	6,515	60,000	9·2	Swinemünde..	8,000	100,000	12·5
Lauenburg* ..	7,320	122,000	16·6	Tapiau	3,770	41,500	11·0
Melsungen ..	3,670	43,350	11·8	Tilsit*	24,600	500,700	20·0
Münstereifel .	2,400	25,000	10·4	Tuchel	2,820	25,000	8·8
Myslowitz* ..	8,100	132,000	16·3	Unna	11,000	140,000	12·7
Naumburg* ..	20,000	358,000	17·9	Weissenfels*..	24,000	350,000	14·6
Oberhausen* ..	25,000	305,000	12·2	Wesel*	21,000	370,000	17·6
Obornik	2,880	32,000	11·1	Znin	2,590	37,000	14·3

Towns marked * have a cold room.

with their slaughterhouses shows the proportion between the cost of building and the number of inhabitants and also the surface of ground occupied.

DETAILS OF SOME OF THE SLAUGHTERHOUSES.

1. Fig. 49. Schönsee, West Prussia. 2,000 inhabitants. This slaughterhouse was built of brick in 1895 for £1,067 10s. The management buildings lie near the entrance, and the stalls close beside them. The establishment is calculated for a yearly slaughter of 400 oxen, 1,000 small animals, and 2,000 pigs. Cost of management, £180 annually; interest and amortisation, £54 5s.; salaries, £54 5s.; miscellaneous, £5.

Town.	Inhabitants.	Size.	Cost to build. M.	Cold room.	Town.	Inhabitants.	Size.	Cost to build. M.	Cold room.
Antwerp....	226	42,228	1,500,000 Fr.	No	Hanover ..	185	70,269	2,480,000	No
Barmen	116	60,000	2,700,000	Yes	Cologne	300	142,800	8,039,063	Yes
Berlin.....	1,500	385,000	11,000,000	,,	Leipzig	363	113,773	5·3,000,000	,,
Bremen	125	30,365	1,590,660	,,	Magdeburg .	200	110,640	4,282,212	,,
Brussels....	180	22,560	2,200,000 Fr.	,,	Munich	350	101,059	4,681,498	No
Chemnitz ..	139	49,460	2,234,076	,,	Nuremberg.	174	71,000	3,302,855	,,
Dresden ..	276	34,264	807,234	,,	Paris (La V.)	2,350	380,000	20 Million. Fr.	Yes
Essen	100	46,000	1,500,000	,,	Prague ...	180	25,000	2 Million.Guld.	,,
Frankf.a.M..	173	41,110	1,892,650	,,	Stettin	110	23,500	1,800,000	,,
Halle	101	49,500	2,594,890	,,	Wiesbaden..	66	27,000	800,000	,,

2. Dramburg (Pomerania). Figs. 50 and 51, pages 122 and 123. 6,000 inhabitants. Municipal establishment, with cold store. Cost, £2,500. The house for the superintendent is over the microscope room and the journeymen's quarters.

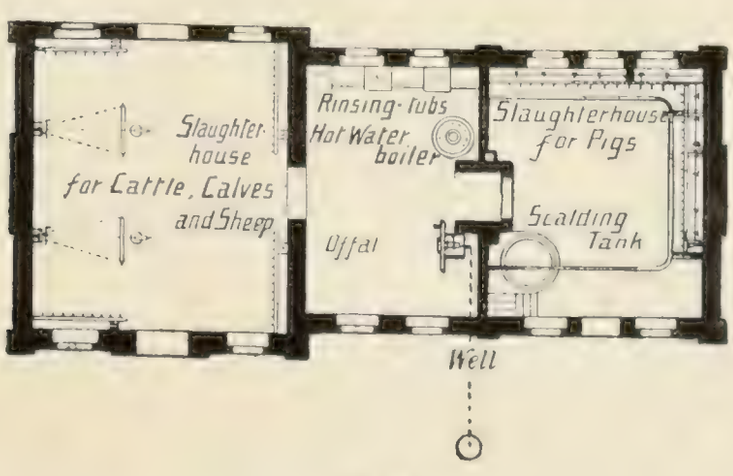


Fig. 49.

There is no special building for the offices of the management, but there is a Freibank and a steriliser. The space allows for a daily slaughter of at least six oxen, twenty-four pigs, and twenty small animals.

3. Freizing, in Bavaria. See fig. 52, page 124. Erected in 1895 for £7,568. Municipal undertaking. Built of brick-

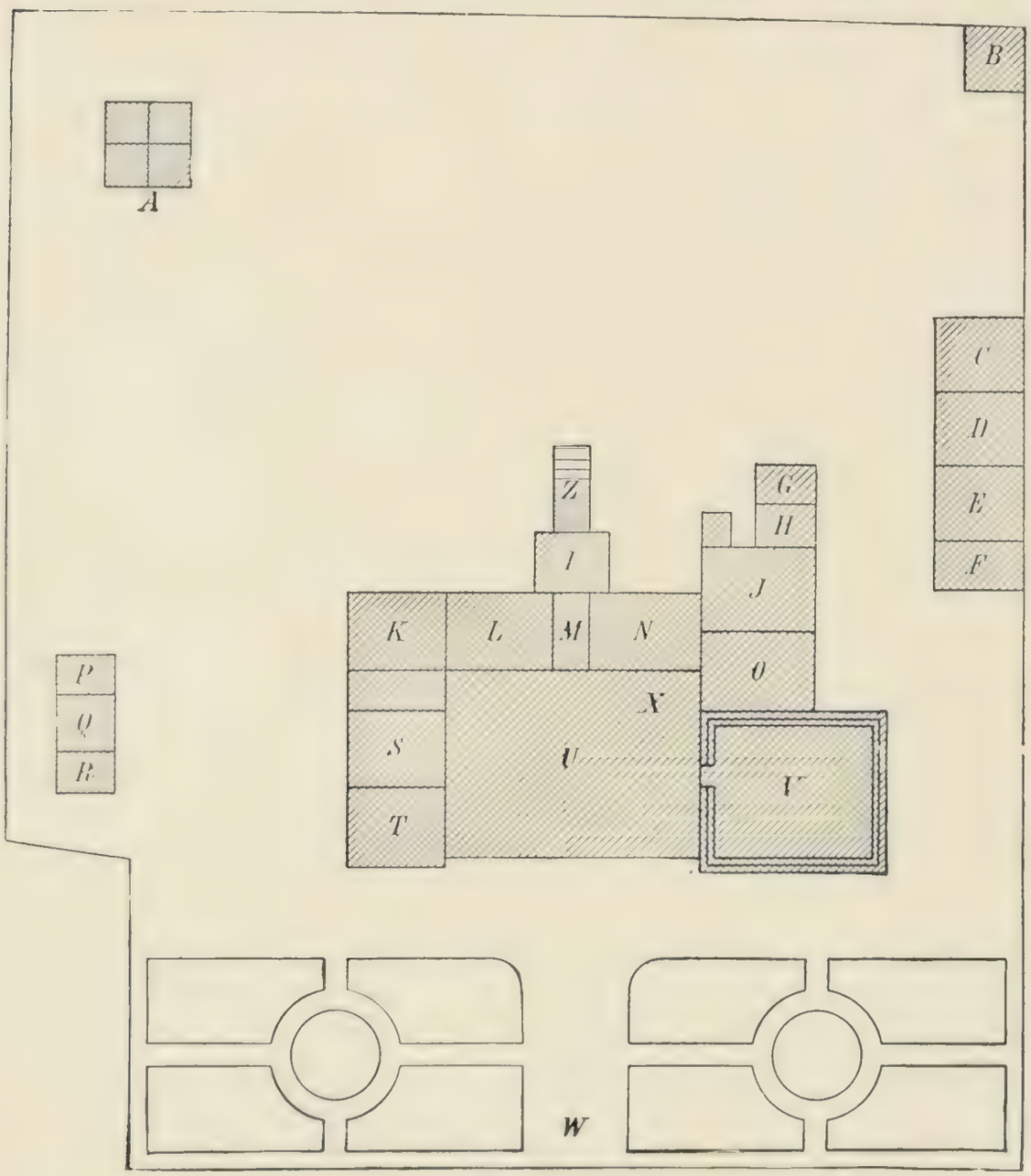


Fig. 50.

A Clarifying buildings.
B Stable manure-pit.
C Police slaughterhouse.
D Stable for sick beasts.
E Horse stable.
F Coal shed.
G "Freibank."
H Sterilisation room.
I Manure house.
J Boiler room.
K Stable for small beasts.
L Stable for large beasts.
M Passage.
N Tripe house.
O Pigsties.
P Off house.
Q Stable for putting up horses.
R Weighing machine for cattle.
S Journeyman's room.
T Microscopic inspection room and office.
U Slaughter hall.
V Ice room.
W Entrance.
X Scalding room.
Z Raised platform for manure waggons.

work, with a pleasing elevation. There is no ice-house or cold room. The entire establishment is illuminated with electric light.

4. Landau, in Pfalz. Fig. 54, page 127. 14,000 inhabitants. Municipal establishment. Built in 1893-4. The cattle-yard covers 12,500 square yards, and the slaughterhouse 10,500

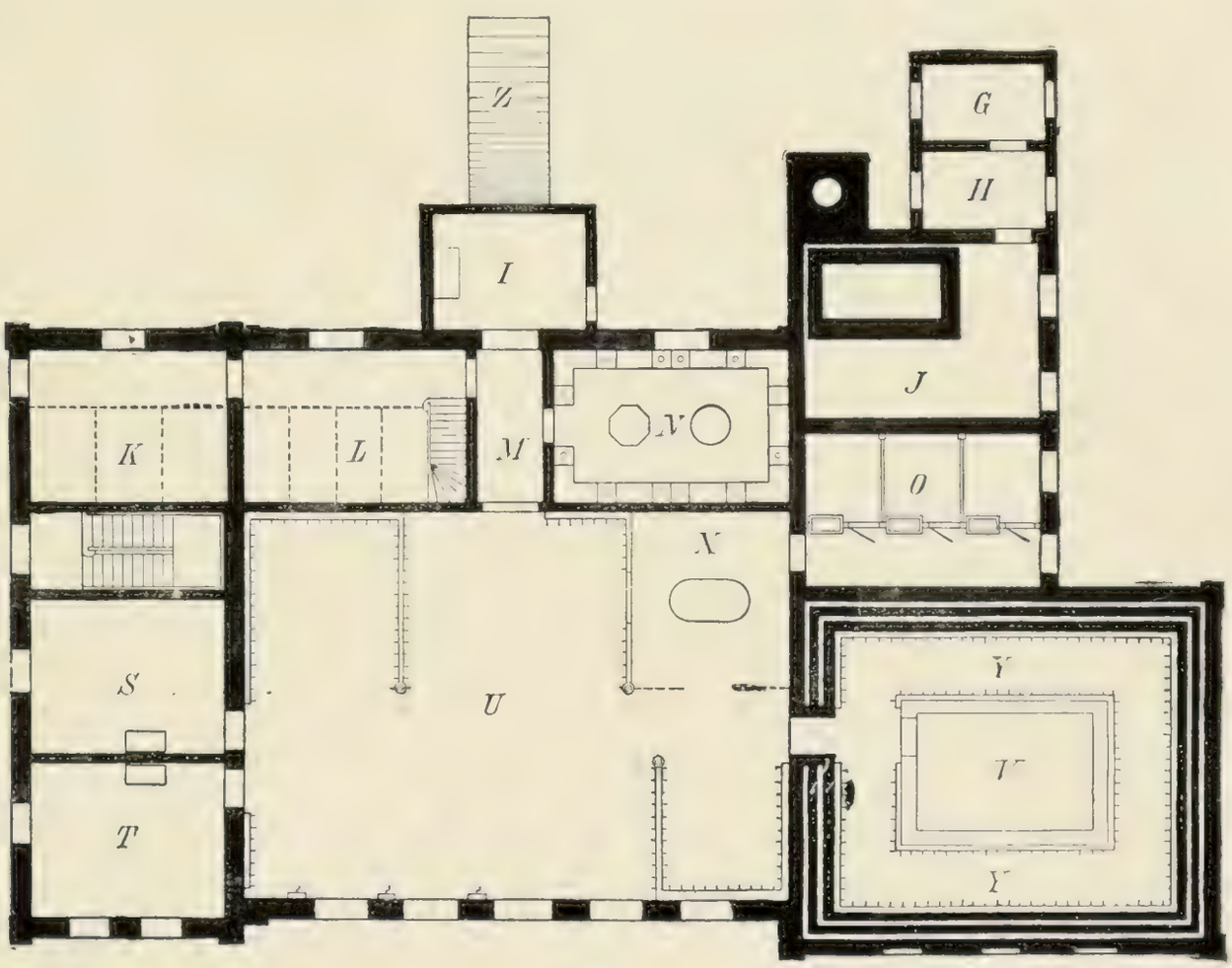


Fig. 51.

G	"Freibank."	N	Tripe house.	V	Ice room.
H	Sterilisation room.	O	Pigsties.	X	Scalding room.
I	Manure house.	S	Journeyman's room.	Y	Cool room.
J	Boiler house.	T	Microscopic room and office.	Z	Raised platform for the waggons that carry off the manure.
K	Stable for small beasts.	U	Slaughter hall.		
L	Stable for large beasts.				
M	Passage.				

square yards. The administration offices and restaurant are at the entrance, and from these run the principal buildings, containing the cold-room and the slaughterhouses for all varieties of animals, containing accommodation for 2,000 oxen, etc., 3,500 smaller beasts, and 6,000 pigs. The cost was about £21,000, exclusive of the value of the ground.

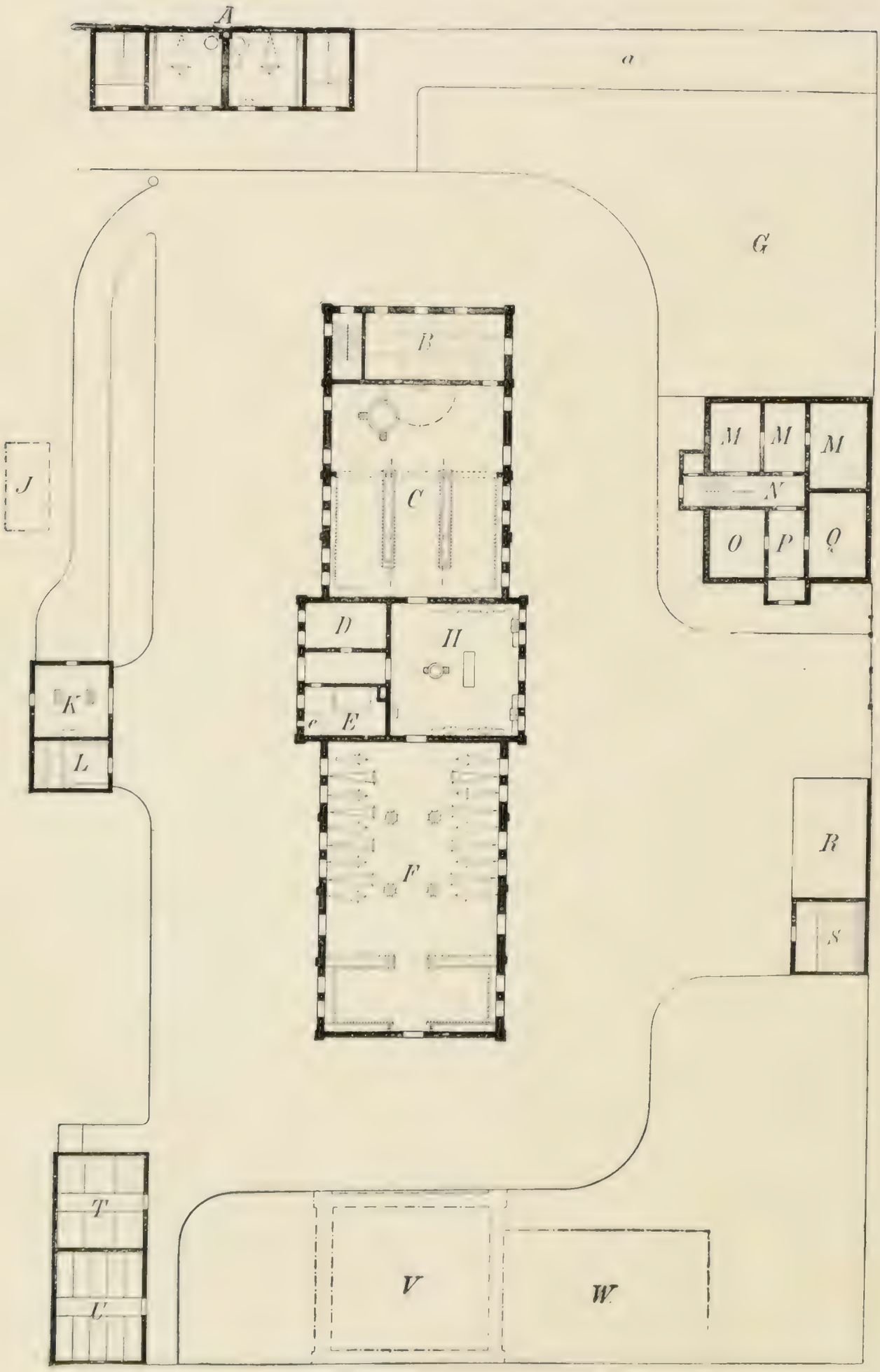


Fig. 52

Special note should be taken of the situation of the stalls for large beasts, half of which serves for the cattle-yard and half for the slaughterhouse. The Freibank communicates directly with the street, and the whole establishment is illuminated with electric light.

REFERENCES TO FIG. 52. FREIZING SLAUGHTERHOUSE.

A	Slaughter hall and stables for sick beasts and horses.	F	Slaughter hall.	P	Waiting room.
	a Driving road to ditto.	G	Garden.	Q	Show room.
B	Pigsties.	H	Tripe house.	R	Shed.
C	Slaughterhouse for pigs.	I	Clarifying pit.	S	Stable for butchers horses.
D	Butcher's room.	K	Manure house.	T	Stabling for small beasts.
E	Boiler house.	L	Lavatories.	U	Stabling for large beasts.
	e Coals	M	Dwelling of hall master.	V	Cold room.
		N	Landing or hall.	W	Engine and boiler house.
		O	Office of manager.		

5. Apolda. Fig. 55, page 128. 22,000 inhabitants. Municipal establishment. Built in 1894-6. Cost £18,000. The cold-room lies between both slaughter-halls, and is connected with a covered passage. There is a special tripe-house for the pig slaughter-hall, and another for the large and small animals' hall. The horse slaughterhouse communicates directly with the street. There is no Freibank. Electric light installed.

6. Gera. Figs. 56 and 57, pages 129 and 130. Ground plan and bird's-eye view. 43,150 inhabitants. Built 1896. Entire cost, £45,000. This municipal slaughterhouse is arranged for the yearly slaughter of 5,000 large beasts, 15,000 small beasts, and 15,000 pigs, and is about one mile away from the town. The entire building is of brick, with sandstone facings. The administrative block and restaurants (with a *special exit* to the street) are at the entrance; the horse slaughterhouse and Freibank have also a special entrance. Two-thirds of the ground is occupied by the slaughterhouse, etc, and one-third by the cattle-yard. On the boundary wall between the two there are the stalls, divided by a cross wall and partitions. The cold storage can be enlarged by adding a second storey. The whole place is illuminated with electric light.

7. Posen. Fig. 58, page 131, is a bird's-eye view of the municipal slaughterhouse. This is for a population of 110,000 (annual slaughter, 8,600 large beasts, 23,700

pigs, and 34,200 small beasts), but can suffice for a population of 150,000 (annual slaughter, 12,400 large beasts, 49,300 small beasts, and 34,300 pigs). The estimated cost was about £110,000, including the site. The arrangement of this slaughterhouse is thoroughly German. The noteworthy features are the separation of abattoir and cattle-yard by central offices and buildings for the use of the officials who control both, and the convenient situation of the sanitary buildings with respect to the cattle-yard and the slaughterhouse, with a separate entrance to the street. The slaughter-halls and the cold-rooms lie on opposite sides of the central passage. In the cattle-yard serving for market purposes there are selling pens.

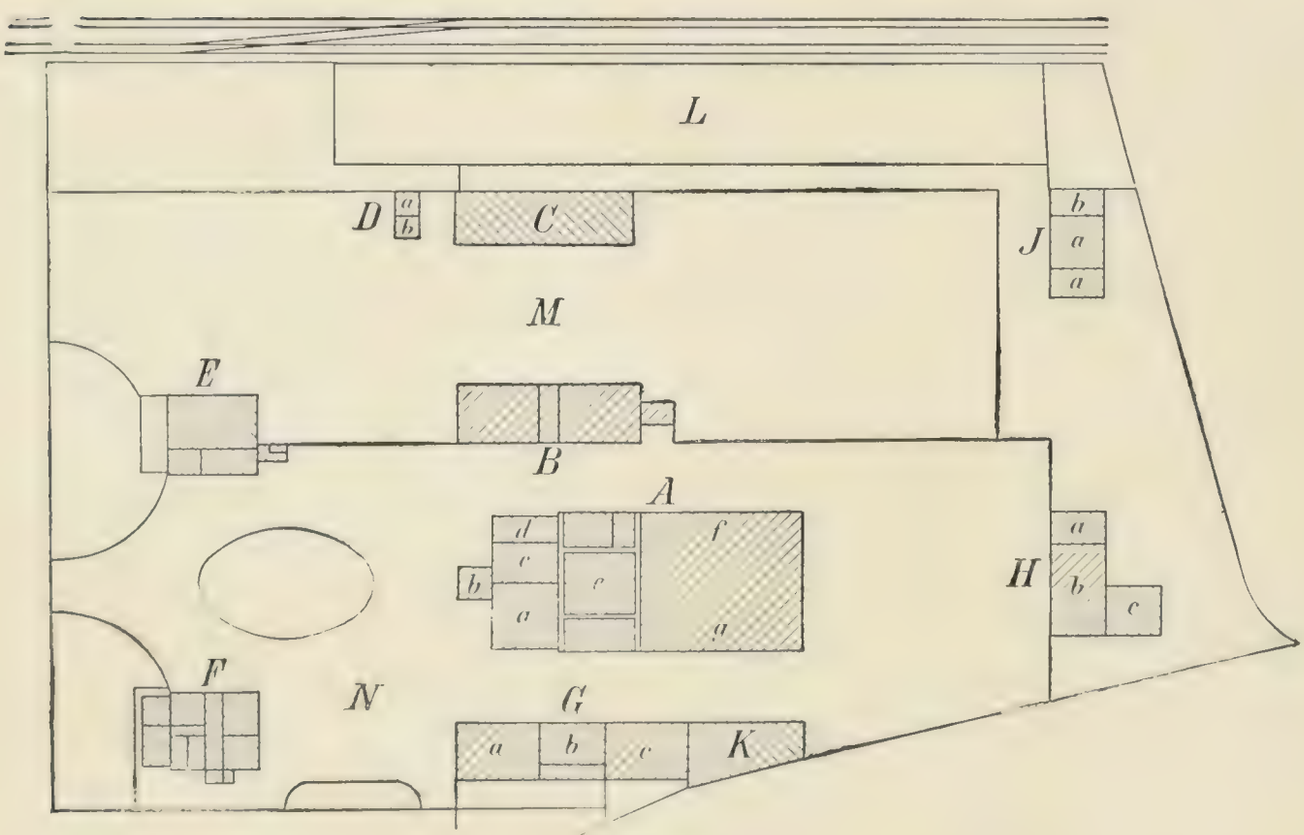


Fig. 53.

A Principal buildings.
- a Engine hall.
- b Room for generating electric light.
- c Boiler house.
- d Cool house.
- e Cool hall.
- f Slaughterhouse for large beasts.
- g Slaughterhouse for small beasts.

B Ox stable.

C Covered stands for oxen.

D Cattle yard offices.
- a Room for railway officials.
- b Room for municipal officials.

E Restaurant buildings.

F Buildings for servants.

G Buildings with engineers' houses.
- a Horse stable.
- b Pigsties.
- c Baths for small beasts.

H Tripe house.
- a Sanitary slaughter-h'se
- b Tripe house.
- c Manure house.

I Sanitary stable.
- a Sick stable.
- b "Freibank."

K Cart sheds.

L Loading platform.

M Cattle yard.

N Slaughterhouse.

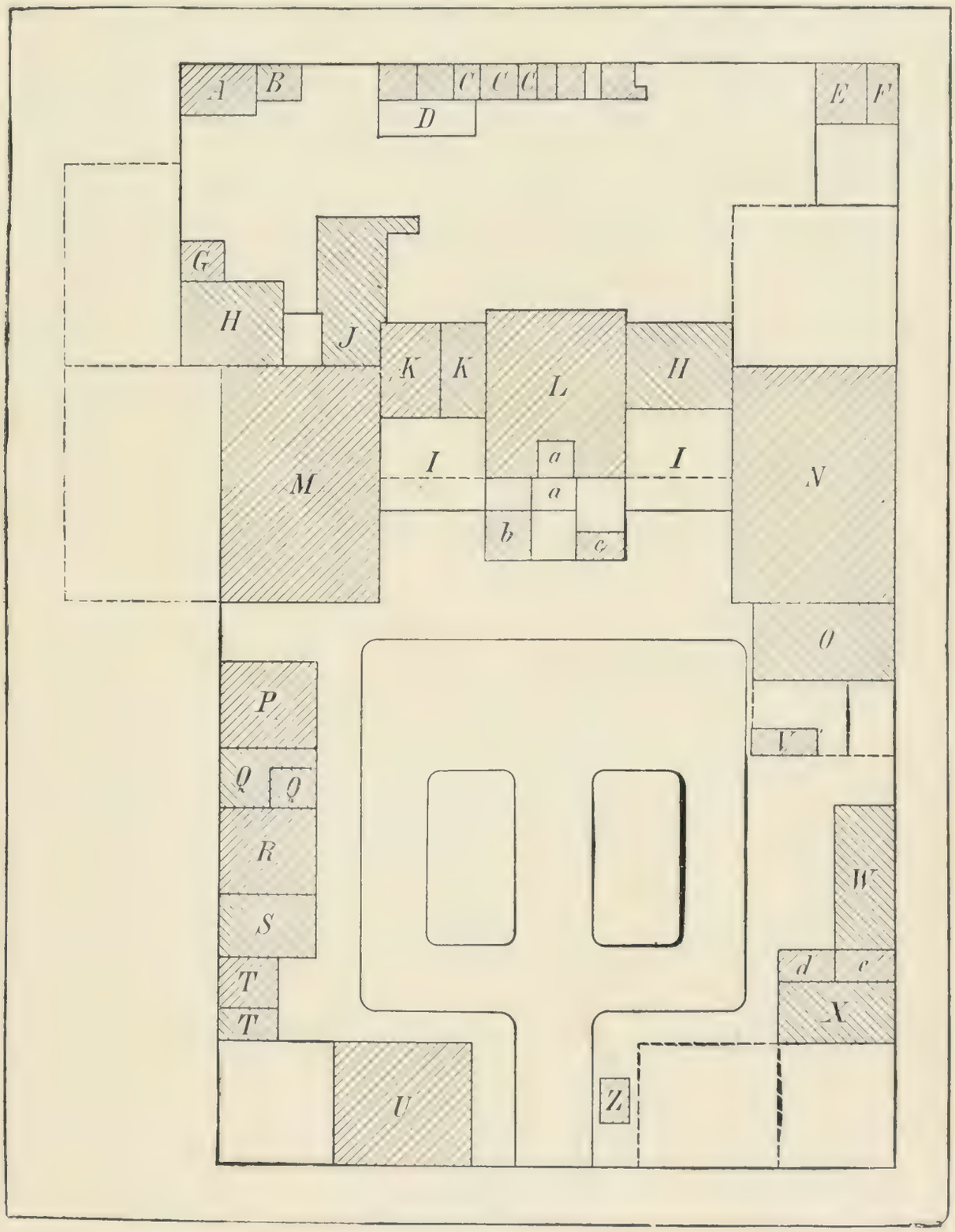


Fig. 54

A Coals.
B Dross.
C Refining place.
D Manure.
E Slaughterhouse for horses.
F Stable.
G Tallow works.
H Tripe house.
I Court.
J Water tower.
K Engine house.
L Cool house.
M Slaughter halls for small and large beasts.
N Slaughterhouse for pigs.
O Pigsties.
P Large and small beasts' stalls.
Q Men's room.
R Ox stable.
S Spare shed.
T Stable for sick beasts.
U Dwellinghouse.
V Platform.
W Sheds.
X Horse stable.
Z Weighing machine.
a Attic.
b Office.
c Hall master's room.
d Dogs.
e Skins and hides.

Space for Extension
Manure
Dining Hall
Kitchen
Cattle Pens
Pigs
Calves
AND
Sheep
Pig Sties
Main Entrance
Passage
Weighing Machine
Cashier
Ins. Pecker
Waiting Room
Passage
Cattle Abattoir
Calves
AND
Sheep
Cold Room for hanging up sides
Scalding Room
Pig Killing Room
Offal Room
Coach House
Extension
Ice Machinery
Engine Room
Boiler
Water Tower
Vacant Space
Horses to be Slaughtered
Yard
Horse Killing
Offal
Manure
Down Room
Boiling
Vacant Space
Yard
Doubtful Meat
Hospital Pen
Killing Room
10
0
10
20
30
40
50
M

Fig. 55.

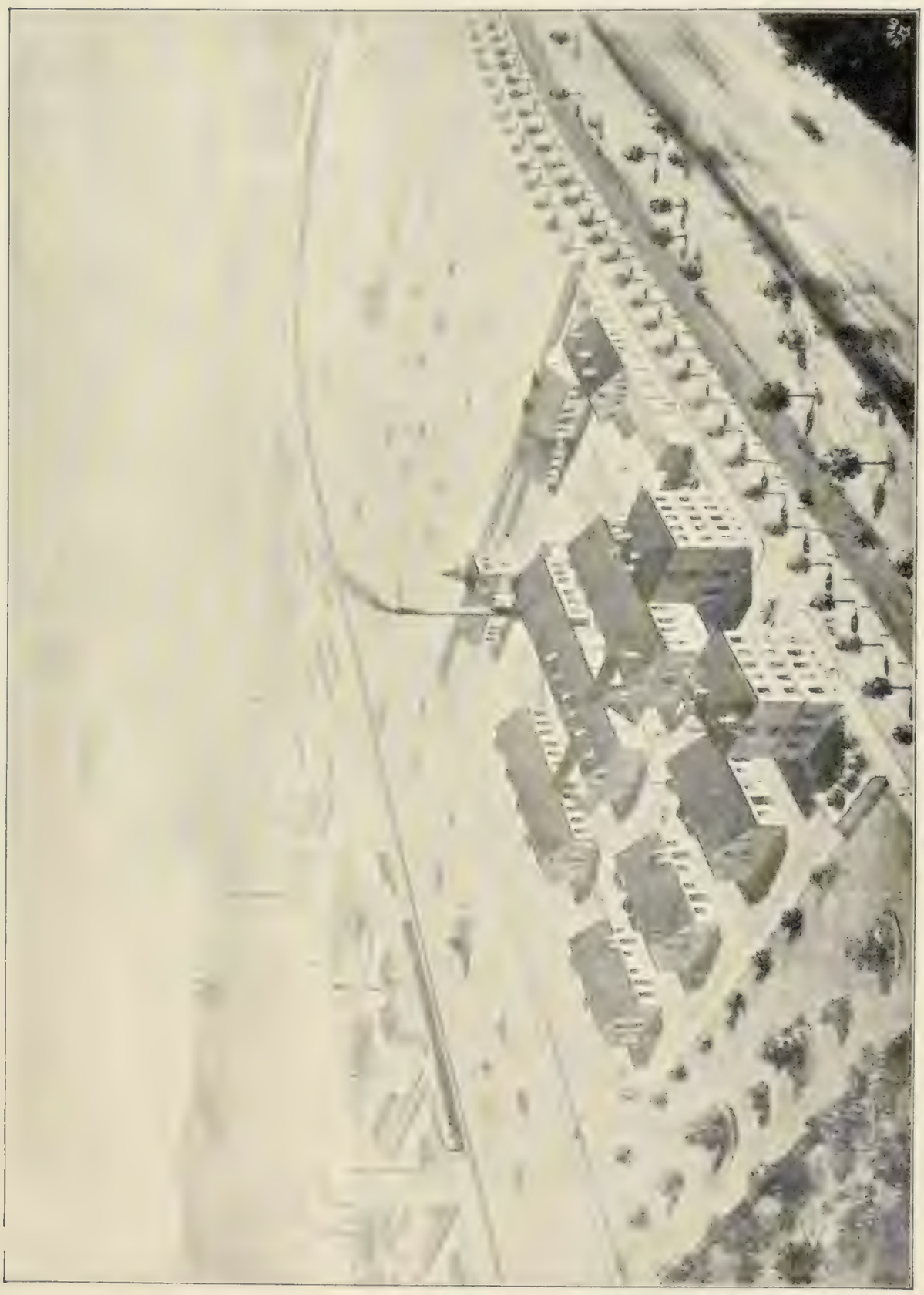


Fig. 56.

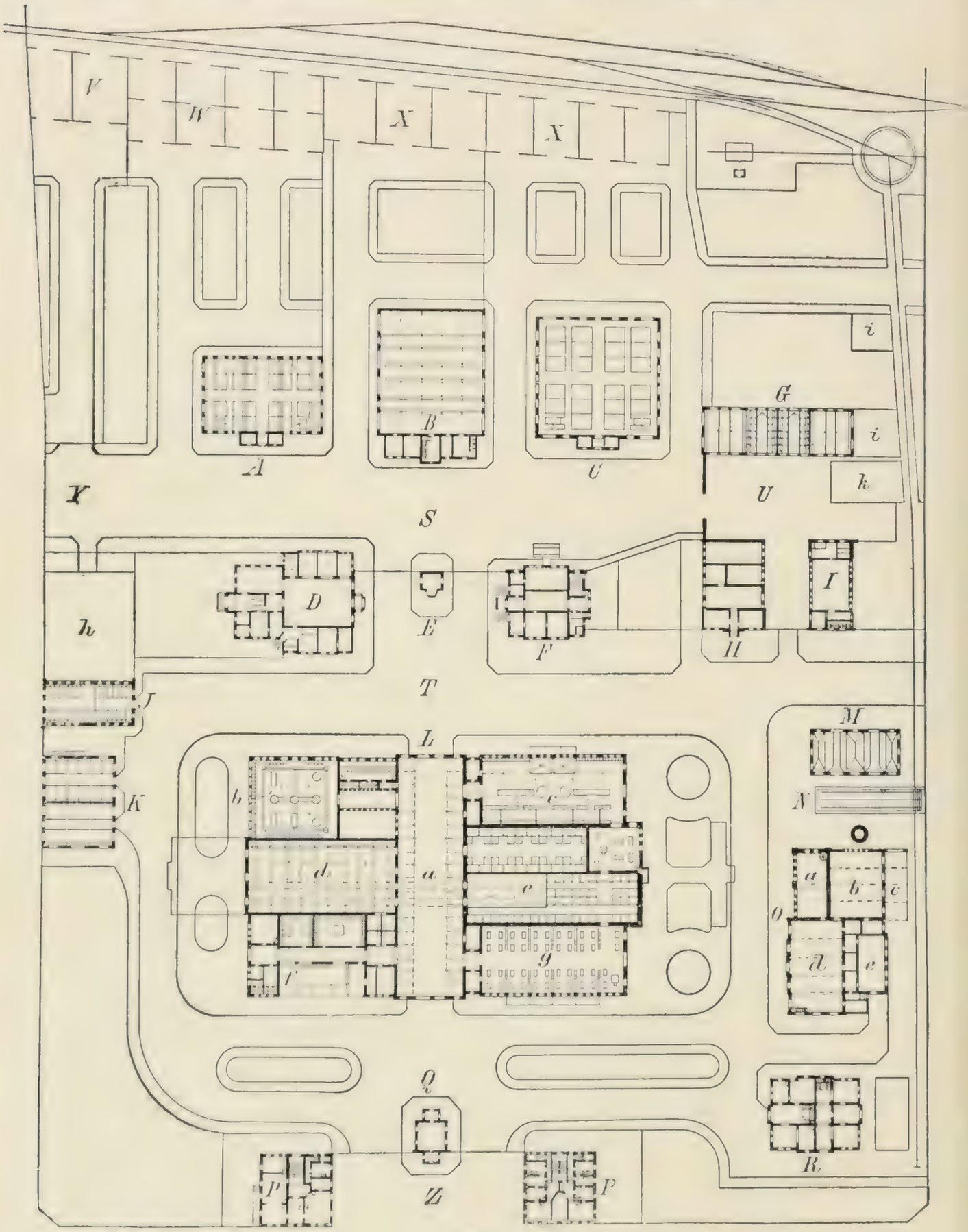


Fig. 57.

A Market for small cattle.
B " " large "
C " for pigs.
D Inn.
E For inspector.
F Manager's buildings.
G Stable for the sick
H Sanitary slaughterhouse
I Horse slaughterhouse.
J Horse stable.
K Slaughter yard stable.
L Slaughter hall buildings.
a Passage.
b Tripe house and microscopic room.
c Slaughterhouse for pigs.
d Slaughterhouse for oxen.
e Cool house.
f Meat inspection room.
g Slaughter hall for small beasts.
h Court.
i Manure.
k Platform.
M Manure house.
N Lavatories.
O Engine house.
a Ice-making room.
b Boiler room.
c Coal shed.
d Engine room.
e Workshop.
P Officials' houses.
Q Porter's house.
R Tallow factory.
S Cattle yard.
T Slaughterhouse.
U Sanitary yard.
V Loading platform.
W " "
X " "
Y Entrance to cattle yard.
Z " slaughterhouse.

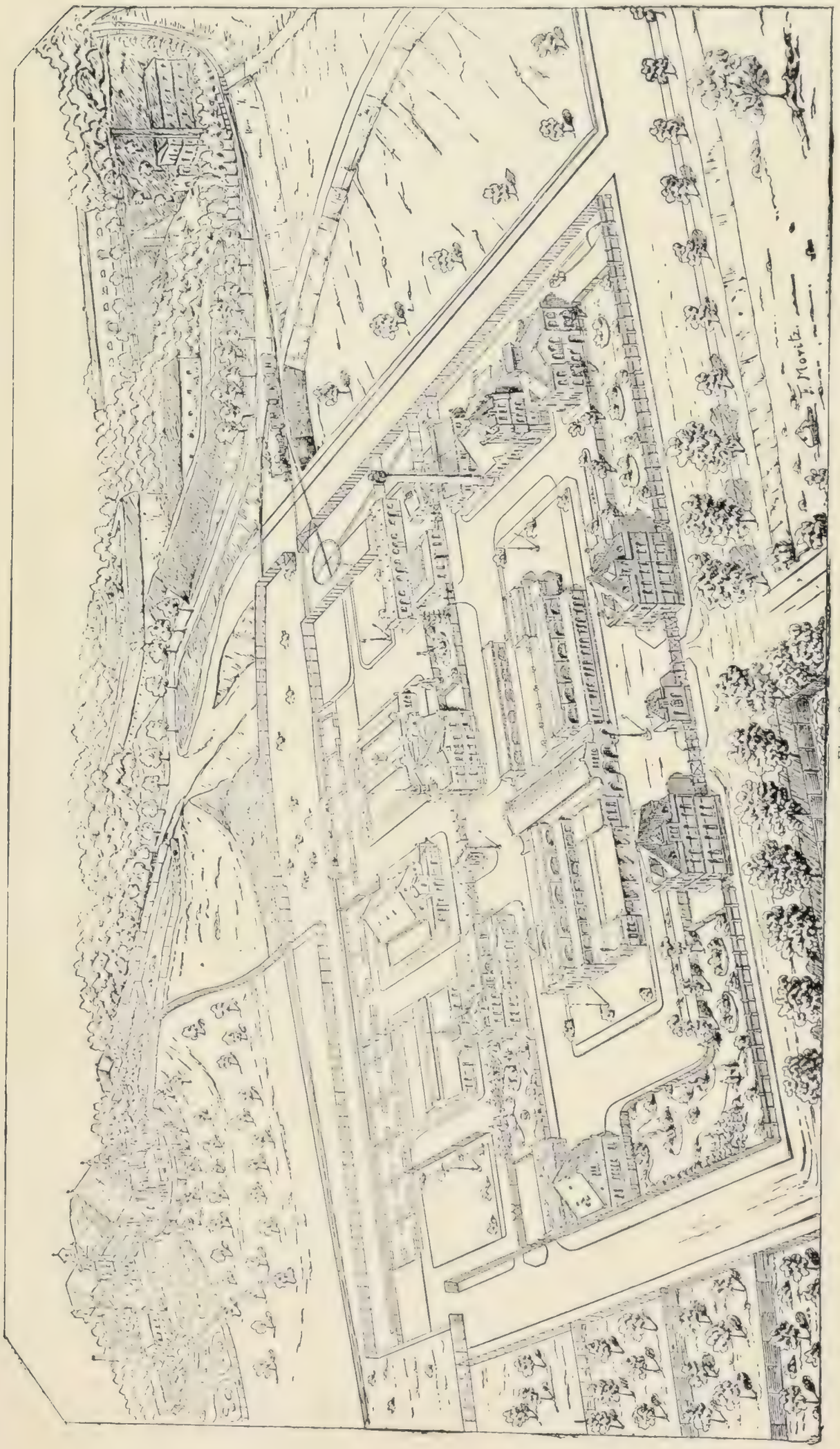


Fig. 58.

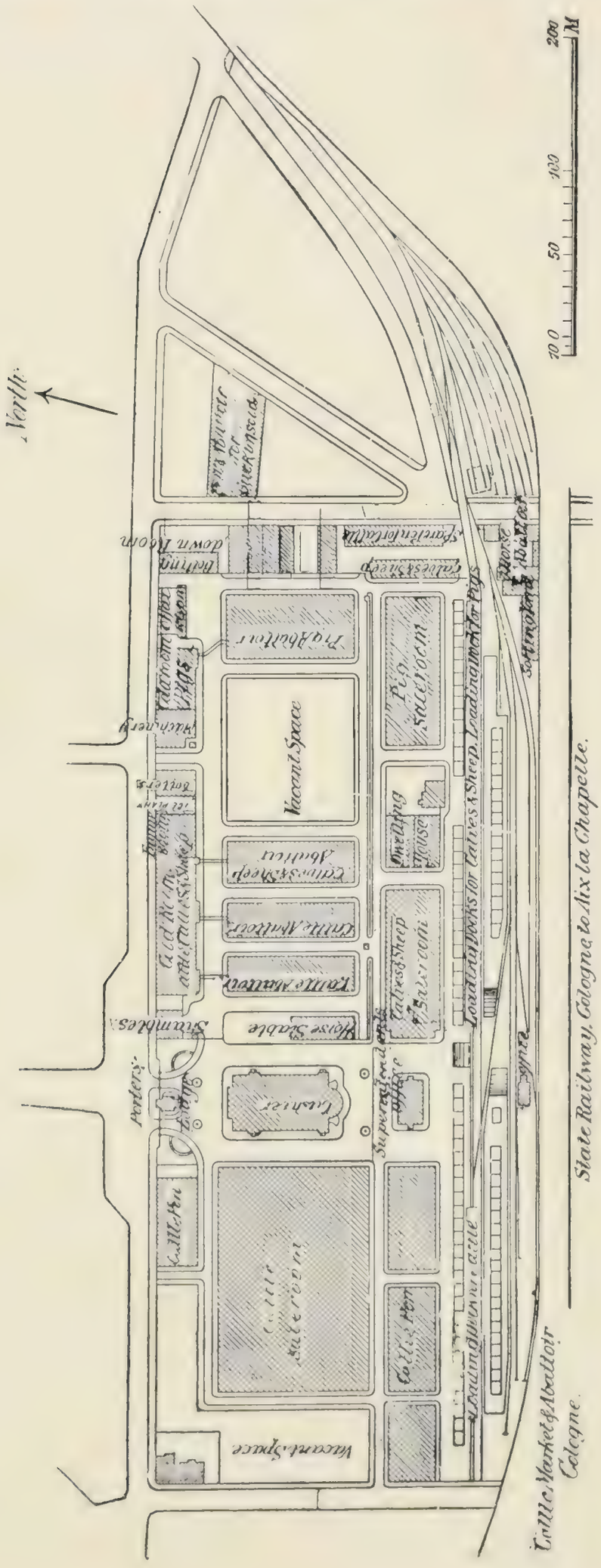

North
Vacant Space
Pig Abattoir
Pig Saleroom
Calves & Sheep Abattoir
Cattle Abattoir
Horse Stable
Cashier
Vacant Space
Cattle Saleroom
Cattle Pen
Porters
Stambles
Machinery
Boiling down Room
Calves & Sheep
Dwelling House
Calves & Sheep Saleroom
Loading Docks for Calves & Sheep, Loading Dock for Pigs
Loading Dock for Cattle
Cattle Market & Abattoir Cologne.
State Railway, Cologne to Aix la Chapelle.
0 50 100 200 M

Fig. 59.

8. Cologne. Fig. 59, page 132. 350,000 population. Establishment laid out for 500,000. Built 1892-95. The entire cost of the abattoir was £401,953, the buildings representing £208,732, and the site £44,155. The area covered is 35 acres. The accommodation is as follows: *The Cattle-yard.*—The cattle loading platform can accommodate 126 railway waggons; 57 waggons can be on the disinfecting line at one time, and the disinfection is carried out by means of steam jets, chemicals, cold and hot water; four lairages for large beasts having 26 compartments, holding altogether 1,200 animals; a market place for 2,000 large animals, and another for 2,400 small or 2,000 pigs. The lairage for the sick animals will hold 66 large beasts. *Slaughterhouse.*—There are two slaughter-halls for large animals with 46 hoists and 150 transport bogies, a slaughterhouse for 1,200 small animals, and one for 1,000 pigs; these are arranged in three divisions, to one side of which lies a scalding-room and to the other side a tripe-washing house. The small animals' hall and the pig-hall are connected with the cooling-house by tracks. There is a cooling-house for large and small animals, and also one for pigs, with a pickle-room; both are two storied. Between the two cooling-houses lie two engine-rooms; the cooling machine has a capacity of 18 tons of ice per day. There are also tripe-houses for the large beasts, manure houses, skin and hide store-houses, tallow-melting houses, an establishment for the manufacture of lymph and a horse slaughterhouse. The buildings for the management and the sale-rooms are well appointed.

APPENDIX TO CHAPTER VI.

SLAUGHTERING APPLIANCES.

It is not now considered humane to slaughter an animal without previously stupefying it, and, consequently, this is always done *before any blood is drawn.*

The "Slaughterhouse Orders" contain in paragraphs thirteen and fourteen of Chapter XI., No. 3, the following definite instructions concerning the stupefaction of all animals:

At the seventh annual meeting of the Society for the Prevention of Cruelty to Animals, in Hamburg (1st to 3rd June, 1898), the association resolved to ask the Home Secretary of the Empire to make it obligatory by imperial regulations that in *every* slaughterhouse there must *always* be complete stupefaction of *every* animal to be killed before blood is drawn, and that the actual slaughter itself *must* only be carried out by experienced men.

Mention may here be made of some methods of killing which are most objectionable, and ought not to be allowed: 1, the nape-stab; 2, the English patent method; 3, the use of explosives, etc.

1. The nape-stab. This is done with a strong dagger-shaped knife, which cuts through and destroys the spinal marrow between the occiput-bone and the first of the cervical vertebræ, so that breathing is stopped by the wounding of the important nerve-centres, but the bleeding is not satisfactorily effected, and the animals retain consciousness to the last.
2. The English patent method. In order to increase the value of the meat as regards nourishing properties, and thus make it richer in blood, they adopt the following method in England: The animal is first stupefied by being struck on the brain, and then the breast is filled with air by means of a pair of bellows, whereupon the lungs fall together and death is caused by suffocation. Of course, such meat does not keep long.*

*This is surely written under a misapprehension, as immediately after felling, the animals are stabbed in the neck, and the aorta or main bloodvessel of the heart severed; the blood instantly rushing out.—EDS.

3. Attempts to kill animals by means of dynamite or electricity have been up till now attended with as little success as the use of alcohol as a means of stupefaction.

(*A.*) APPARATUS FOR STUPEFACTION.

1. *For Oxen and Horses.*—The oldest and best method for stupefying an animal to be slaughtered is undoubtedly a blow on the head with a hammer or a pole-axe made for the purpose, a cleaver, or a club. Concussion of the brain results immediately the skull is broken, and the animal collapses instantaneously, as if struck by lightning, and is at once unconscious, so that the blood can be drawn by cutting the blood-vessels of the breast or neck.

But such a surely dealt blow requires both skill and strength, and only *a small and rapidly diminishing number of butchers can accomplish it;* so that where there are no experienced men appointed for the purpose, as is the case in large towns, there must be contrivances at the disposal of everyone for the certain stupefaction of the animals.

A pole-axe much used in South Germany has a wooden handle, to one end of which is fixed an axe or hooked head, with which the animal can be grasped by the horns, while the other end is a sharply ground hollow gouge, about 4in. long and $\frac{3}{8}$in. diameter, so that the bones and pieces of skin can be pushed through and fall out. The sharp end of the gouge is driven into the middle of the brain-pan by a powerful blow, whereupon the animal at once collapses. Then through the opening in the skull a Spanish reed or a probe is inserted (this is termed "pithing" in England), by which the medullary substance in the brain and the marrow of the back are destroyed. After this the blood is drawn. According to Schmidt of Mulheim, very little blood is got by this method, and the meat therefore does not keep well. Besides, false hits occur, which result in the animals receiving deep wounds attended with great pain in some other part of the head, so that this method cannot be considered perfect.

But in order that such a gouge may be absolutely driven through the brain-pan, it is sometimes enclosed in an iron-guide, which is held firmly on the head of the animal by means of a mask. This mask is now in general use, and, thanks to the agitations of the Society for the Prevention of Cruelty to Animals, has been

introduced, not only into all public slaughterhouses, but also into a great number of private slaughterhouses, especially in the country. It consists of an iron plate, varying in size, forming the centre of a leather mask covering the animal's eyes, and is fastened to the horns and the snout so that the round opening in the middle of the iron plate is right over the centre of the brain-pan. In this opening a gouge is inserted, which has a button-shaped, ridged striking-plate at the outermost end of it, and this is driven through the skull by means of an iron-bound wooden hammer, so that the result is the same as with the pole-axe. These masks have undergone several rather important alterations of late which make the process much easier.

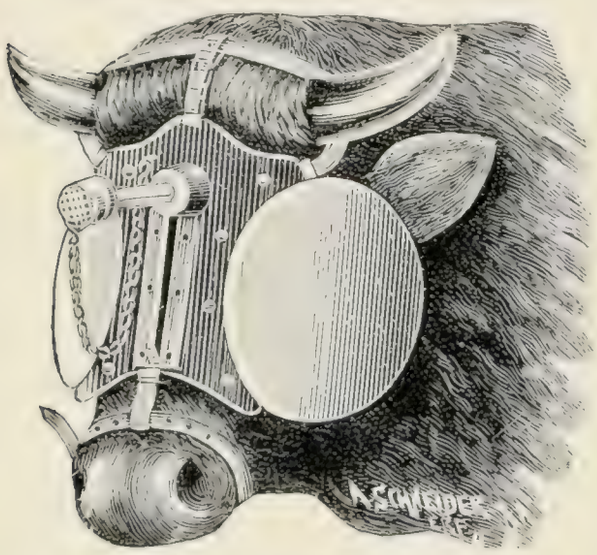


Fig. 60.

It sometimes happens that animals do not succumb to the first blow, although properly dealt, owing to a strong growth of hair on their brows, together with such thick firm skull bones, that penetration is not easy. This is particularly the case with bulls, when very strongly developed forelocks of these animals give only a sort of elastic resistance. If the mask specially recommended for this purpose is not used, a bolt made of a steel pipe with a sharp outer edge will serve the purpose. If a little skill is used by the butcher in the manipulation of this instrument, stupefaction will result at the first blow almost without exception, even when the skull bones are thick and hard.

Fig. 61.

There are various masks made with a large plate of cast-iron. (See fig. 60.) Some of these are made with borders (occasionally cross-shaped) for the purpose of parrying any false blows. The bolts for all these masks are fastened to a small iron chain. But it often happens that by unskilful strokes or insufficient fastenings these chains snap and the bolt springs back, particularly if a crooked stroke is made. In consequence of this, Kögler has invented a bolt with a longitudinal groove (*a*),

in which a pin engages (*c*). (See fig. 60, page 136; also fig. 62, below, for a vertical section.) This prevents the bolt from falling out or springing back.

The slaughter masks for large and small beasts constructed and patented by Th. Rom, of Copenhagen, have been tried as an experiment by the author, but he has found them impracticable.

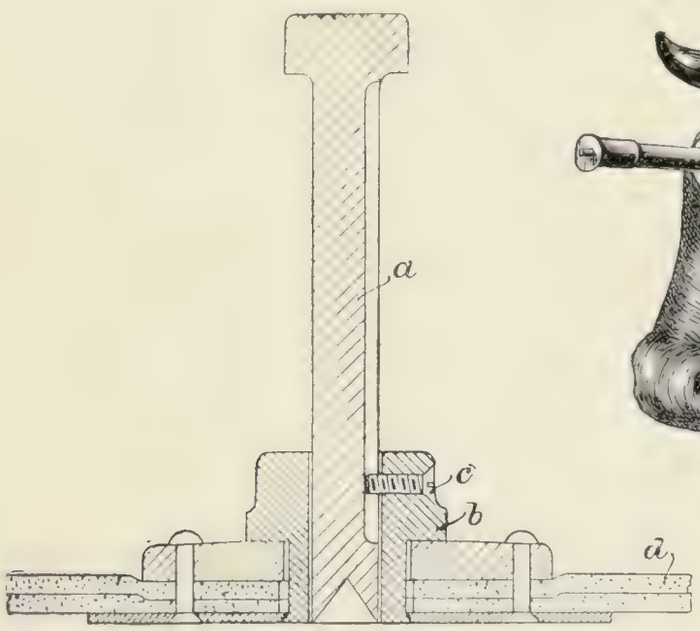


Fig. 62.

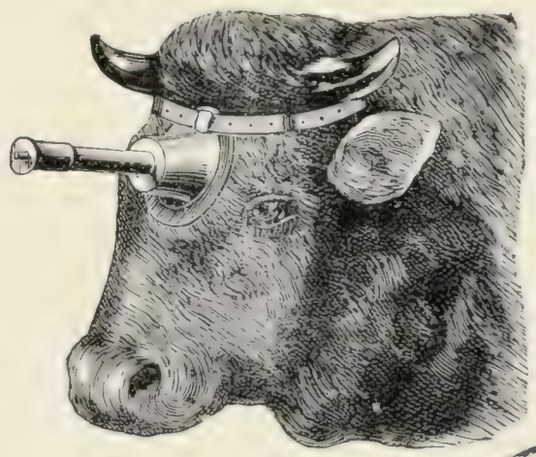


Fig. 63.

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They consist of three movable iron hoops fastened to a guide plate, which span the head of the animal to be stupefied in such a way that the uppermost hoop serves for putting in the bolt, which is fastened to the supporting plate, while the side hoops secure the mask to the head of the animal by means of springs.

In place of these, shooting masks are sometimes used. These are an invention of Herr Siegmund, the slaughterhouse manager in Basle. Instead of the bolt, a short rifle-barrel is set in the front plate with a gunlock, while the other end serves for the insertion of the cartridge, and is closed by a lock. After the animal has the mask buckled on in the stall it is led into the slaughterhouse, where the brow is fitted with a barrel with a cartridge in it, and the needle in the lockhead is touched by a small iron hammer, whereupon the gun is discharged, and the animal silently collapses. The force is so great that the shot penetrates through the brain right into the vertebral column.

Instead of having a mask, the actual shooting apparatus can be fastened by straps to the head or simply held against the brow by the hand. The point to be chosen for this latter method is exactly halfway between one horn and the opposite eye.

The detonation with the ammunition used for the former invention is pretty considerable, so that ammunition which is of small detonating power, and if possible smokeless, should always be used.

Another apparatus has been invented lately so as to lessen the effect of detonation and the smoke. It is seen in fig. 64, page 139.

An objection has been made to these shooting masks on the ground that if the apparatus is not properly fastened wounds are very easily made by the rebounding ball in the hands of unskilful workers.

Such cases are, so far, extremely rare. A much more weighty objection is that the bleeding may be only partial; for this is actually the case if the ball hits the spinal marrow, which, however, only seldom happens.

Lately, experiments have been made with dynamite cartridges, but the results of these have not yet come to hand.

A master butcher (F. Tippert) has patented an apparatus whereby animals are stupefied by means of *compressed air*. It consists of a T-shaped metal casing, which is provided with a piston, and it can be held stationary by a trigger, when the cylinder is filled with compressed air. The orifice of the casing is set against the brow of the animal to be killed, and the trigger is released, allowing the compressed air to drive the piston through skin and skull into the brain. Then a valve opens by means of a special mechanism, and the compressed air enters the brain of the animal through a hole made by the piston, which causes immediate stupefaction. The results of experiments as to the efficiency of this apparatus, which is made for large and small animals, have not yet been submitted to us.

2. *Stupefaction Apparatus for Pigs.*—The simplest method of stupefying pigs is to give them a blow on the forehead with an iron hammer or a wooden club faced with iron. Or—

The spring-bolt apparatus invented by Director Kleinschmidt, of Erfurt. It consists of an iron casing, in which there is a gouge-like bolt surrounded by a strong spiral spring. This apparatus is held on the forehead of the pig to be stupefied, and then the bolt is

driven into the brain by a powerful blow with a flat wooden hammer, whereupon it immediately rushes out again by virtue of the spring in the casing. As the apparatus is rather difficult to handle, and two men are required to work it, it is often supplanted by an invention by Kögler, of Chemnitz, called the *slot-hole bolt apparatus*. It is characterised by its light weight and the ease with which it can be handled. (Fig. 65.) As the bolts of these apparatus sometimes get jammed in the skull bones, and are hard to get out, a long spring is applied as a remedy (see fig. 65a).*

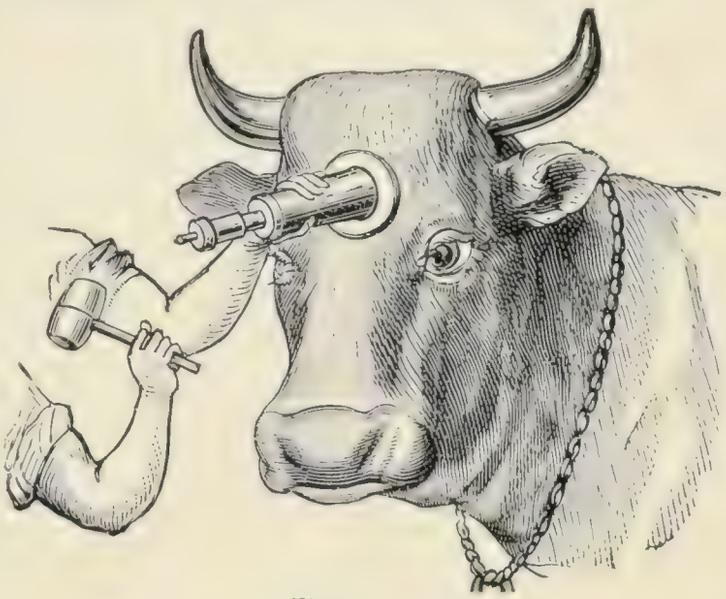


Fig. 64.

Fig. 65.

All these appliances offer difficulties in holding them correctly on the head of the pig. For, as the latter is nearly always restless after having its foot bound to the tethering ring, misses are not uncommon, and such an apparatus can easily become an instrument of torture to the animal, if a number of vain attempts are made before it is stupefied in the desired manner. The apparatus by Meurer would remedy this, but is not quite satisfactory owing to the frequent want of repair through false hits. It is a bolt apparatus with a couple of springs for fixing it on behind the ears of the pig.

Renger has constructed a slaughtering apparatus

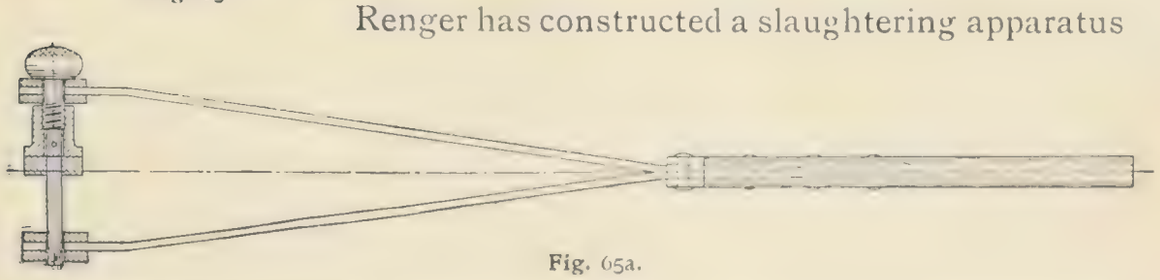


Fig. 65a.

*A very simple apparatus has been invented by Director Koch, of Barmen, and seems to answer the purpose admirably.

(see fig. 66) by which the head of the animal to be stupefied can be kept still, while the side can be let down as soon as blood-letting begins.

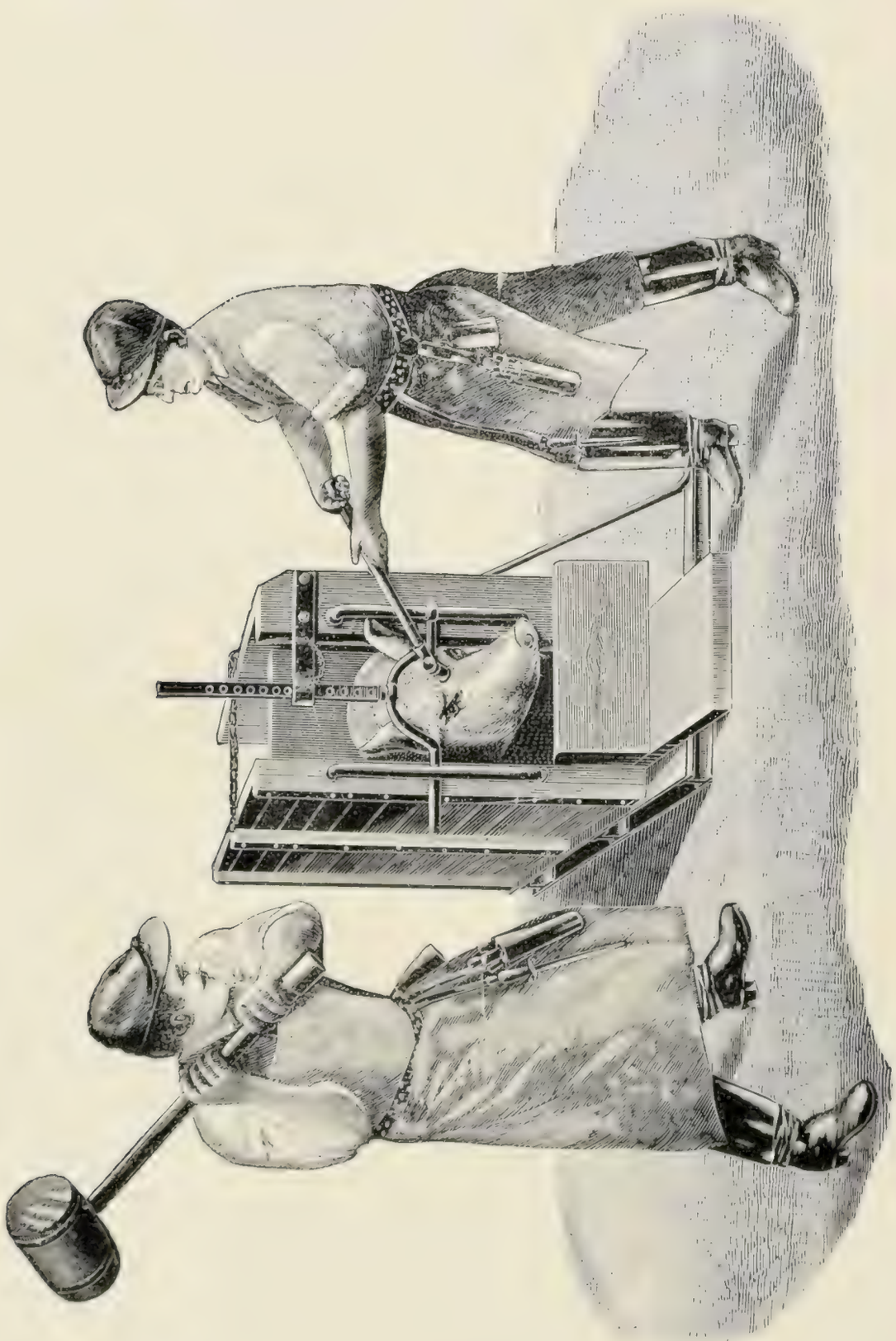


Fig. 66.

3. *Stupefying Apparatus for Small Animals.*— Besides the iron-bound clubs there are others in the form of a pestle, which are very handy, though weighty, owing to the head being filled with lead.

A swage (as fig. 67) is much used for heavy calves, bucks, and rams with large horns, and is recommended also for the stupefaction of Hungarian swine. It is driven *directly* into the cranium by means of a blow from a club. There is another kind of hammer, sometimes used to kill sheep, which is 4in. long, $\frac{3}{4}$in. broad, made oval and ground at both ends, and fitted to a handle about 2ft. 6in. long. Meurer makes a hammer for small beasts similar to that manufactured by him for swine, as already described.

(*b.*) APPARATUS FOR TEACHING SKILL IN SLAUGHTERING.

So that young tradesmen may have as early an opportunity as possible in practising how to become experts at their trade, and attain sureness of aim before making a living animal the target of their attempts to try their strength and skill, apparatus for practice has been constructed, which has already been installed in some slaughterhouses. By means of these mechanical devices, beginners learn to hit a button with certainty before they are allowed to experiment on a living animal.

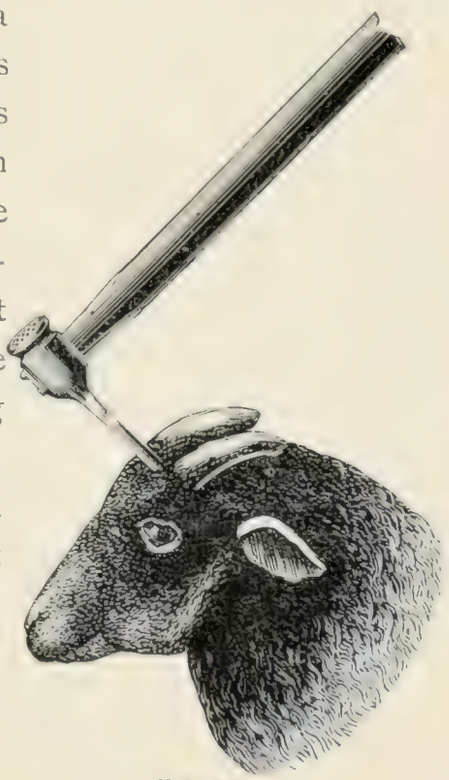


Fig. 67.

The simplest and also the cheapest appliance of the kind consists of a short post buried 3ft. to 5ft. deep in the ground, and well rammed down into the earth. Its uppermost end is pointed and is provided with an iron ring and an iron bolt-head. The beginner must now try to hit the bolt-head exactly, without striking the post, from the *side*.

The other mechanical devices previously in use are constructed on the principle of the well-known dynamometer; for instance, a wooden mallet is made to strike a button fastened to a strong spring, so that the spring is compressed a certain distance which is indicated on a scale.

The oldest of these mechanisms, used in the central slaughterhouse at Berlin, on which practice is compulsory for apprentices by an order of the guild, consists of two boxes or cases, which are fitted up on a strong frame, and revolve on two axes. The upper box

exactly fits into the other, and a double spring is so fixed with a bolt and a plate that the two boxes hold together. If the beginner hits the bolt-head, the spring in the apparatus is compressed to the extent indicated on the dynamometer scale. Another apparatus, like that just described, consists of a simple spring, on which there is a bolt provided with a button. This device is either attached to a sloping frame, or it can be fixed firmly into the ground on the same slope,

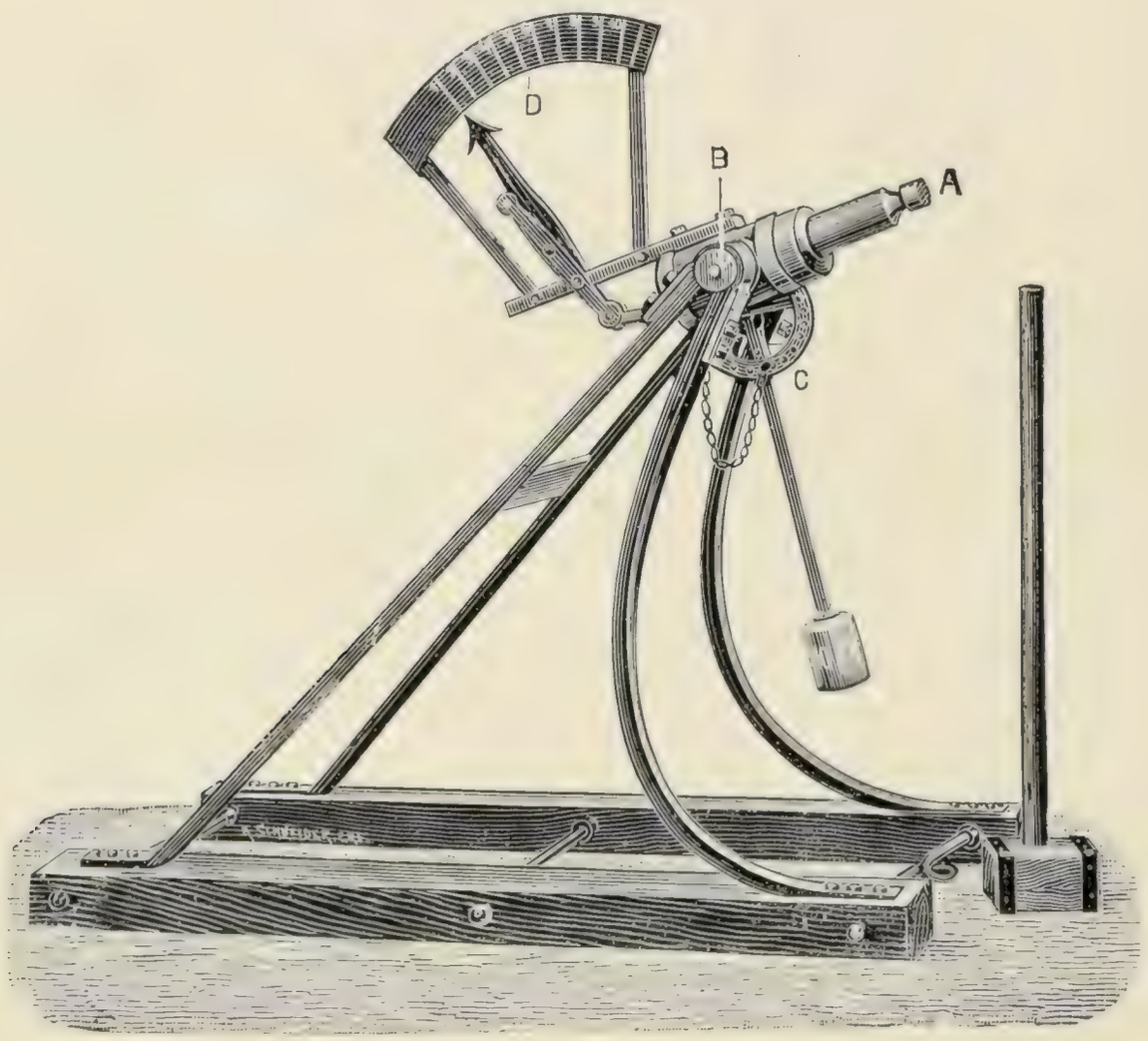


Fig 67.

with strong wooden supports, about 6ft. long, screwed to it. The mark in both these devices is a wide one, and the button always being at the same height, little skill is required. The new apparatus by Stoff (fig. 68) requires more skill, the *button being only the size of the bolt-head* of a slaughter mask (about 1½in.), and is admirably suited for the purpose of practising. Besides this, the button can be fixed at from 2ft. 6in. to 3ft. 6in. from the ground.

(*c.*) APPARATUS FOR KILLING CATTLE ACCORDING TO JEWISH RITES.

There have always been discussions as to whether a rush of blood from the brain and consequent unconsciousness result immediately on the opening of the cervical artery. Such *can* only be *certain* if the animal is made passive and powerless by means of fetters or stupefaction. No one has ever yet succeeded, nor ever will succeed in *reducing an animal to a state of perfect unconsciousness by fetters and shackles as quickly as can be done by a stupefying blow*, as some three or four minutes must elapse—sometimes three or four times as long through unskilful treatment—before the animal is prepared for slaughter, consequently it should be made *unconditional* that *stupefaction must take place* before blood-letting occurs. The animal is thus saved a *lengthened period of unnecessary torment*,

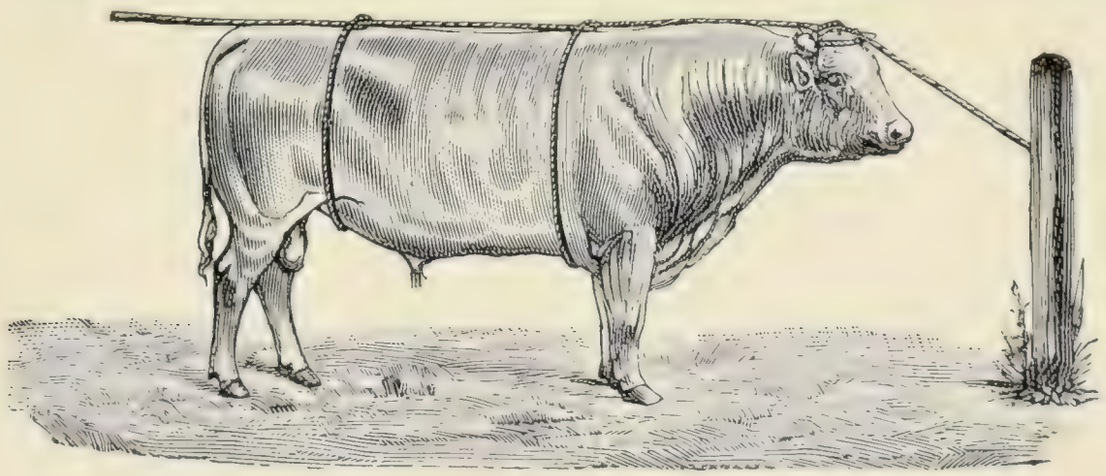


Fig. 69.

without regarding the wounds of all sorts caused by the "throw" and death struggles. It is then immaterial whether the breast-stab or the neck-cut is given. This demand, dictated by common humanity, is all the more justifiable when it is made clear that the Jewish method of killing does not rest on any command from God—that is to say, it has no biblical ground, but is authorised as a command of the Talmud by a number of learned Rabbis.

But, alas! as long as the Government allow the Jews a separate building* in which to kill according to their own ritual, so long at

*In the kingdom of Saxony, by Ministerial Order of March 21st, 1892, in Saxe-Meiningen, by an order of May 23rd, 1891, and in Switzerland by a command of the Republic, the killing of animals *without* previous stupefaction is forbidden. The Jewish method of slaughter is forbidden by the municipal corporation of the town of Hof, in Bavaria, and is limited only to the number absolutely required by the Jewish population in the town of Reydt, both orders being by permission of the Government (May 18th, 1897). The "slaughterer" is appointed by the managers of the slaughterhouse, and is only allowed to use his knife on the animals of Jewish butchers A like command has been issued in Viersen.

least must every care be employed in seeing that the animals are knocked down in the way that will spare them as much pain as possible, and that the heads of the animals to be thus killed are fixed to prevent them knocking against the ground in their death struggles.

The oxen are held down by a rope about 65ft. long fastened to a ring, and then bound round the horns and body of the animal in the manner shown in fig. 70; it is then pulled tightly until the animal slowly rolls over on its side. This method is not so common in North Germany as *throwing*, which is done thus: The animal is secured to the ring in the ground by a chain round its neck, and then its forefeet are shackled by a short chain. (This chain can have a ring in the middle, through which the long chain is drawn.) Then a second chain, about 13ft. long, which has a hook at one end and a ring at the other, is fastened to the animal by one of its hind feet, the other end is then wound round the chain on the forefoot (or through the ring if there is one) at the opposite side to the hind foot just fettered, and pulled up high and hooked on to the eye in the middle of the tree hanging from the hoist. Then the tree is slowly wound up, and the animal, which is supported at its head and tail, is slowly laid on its side. As it is not at all uncommon for the outer angle of the iliac bone to be broken by the "throw," mattresses covered with leather or indiarubber are sometimes laid below the beasts, but this method has been considered impracticable on many grounds.

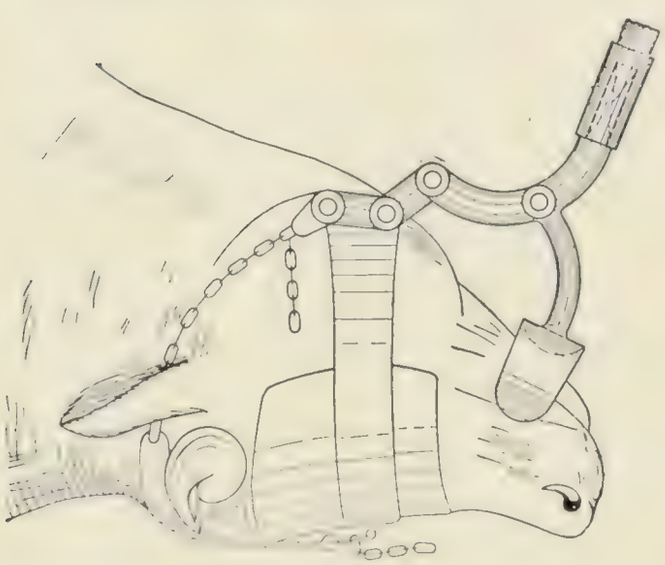


Fig. 70

To make the fall as soft as possible, the following method, invented by A. Maas, of Coblenz, has been recommended: A belt is buckled round the flanks of the ox after it is secured to the ring in the ground. This belt is provided with a ring this shape △. One tree hook of the hoist is put into this ring, and wound up somewhat high so that the animal is lightly raised. After fettering it in the

customary way, the animal is rolled over by a second hoist in such a way that the girdle prevents any striking over or sudden fall on the hindquarters.

If the animals are weak, the head can be kept still during the act of slaughter as well as after it, without any special appliance being required for the purpose, but this is not possible with strong bulls and oxen. The head can be fixed by winding a strong rope several times round the nose of the beast and putting a short rod through, using the horns as a support for it. But this kind of fixture is too unreliable and too painful for the animal to be much used, consequently Jacob constructed a special head-holder (as fig. 70, page 144), which is found very serviceable.

Besides these appliances, there have been quite a number of others invented within the last few years, particularly since the prohibition in Saxony. They are not only for the purpose of laying the animal flat with all possible saving of pain, but also for keeping the animal fast in a favourable and sure position for slaughter. But most of these are too troublesome to be practicable, and so are only mentioned here very briefly.

1. The apparatus by Pulvermann differs from the other in that slaughter is carried out on the animal when *standing*. The fixing is done thus: The four feet are put into four holes in a floor-plate up as far as the knees, and are held fast in it by means of cramp-irons. The cut is then made, after which the head of the animal is drawn upwards and backwards by means of a rope and a pulley.

   One of the drawbacks of this method is that the space below the plate is difficult to cleanse thoroughly from the blood that flows into it, and it is also difficult to guide the stroke or cut of the slaughterer on account of the standing position of the animal.

2. The appliance by J. Gollnow consists of a little low-wheeled foot-plate and two broad side-plates with indiarubber cushions. These side-plates can be let down. The animal is led on to the foot-plate, and is held on this firmly so that it cannot move, when both the side-plates are connected at the top ends by a rack, and the head is fixed by a special contrivance. In this position the animal is slowly laid on its

side against the cushioned walls, the head is bent backwards, and slaughter is carried out.

The experiments made in the Stettin slaughterhouse with this apparatus have not been satisfactory, as it requires too much time.

3. The apparatus by Joger consists of a wooden wall, which will fold down, and to which the animal is secured, it being afterwards laid on its back by means of a hoist.
4. The killing apparatus for oxen by Rothmüller and Friedrich Bromberg consists of a hollow drum, revolving and resting on pulleys by means of spur gear, which has a rough inside surface for the animal to walk on. The ox is bound to a chain, and then grasped by flexible shields which hang in the inside. By turning the drum the enclosed animal is laid on the back, killed, and let down on a waggon driven underneath it, and is afterwards taken away.
5. The slaughtering machine by L. Goebel. The animal to be slaughtered is raised up from the ground by means of a broad belt, which is strapped round underneath the belly, and which is fastened to a cylinder or to a pair of cylinders: by the revolution of one cylinder, or by the simultaneous revolution of the two, it is then brought from a perpendicular into a horizontal position by winding up the rope bound round the feet. There is also an appliance for mechanical killing, by which a knife pushed under the neck of the animal is put swiftly into motion by springs or counter-weights.

   A better bleeding-out* is effected, owing to the hinder part of the animal hanging higher than the forefront.
6. The Jewish and gag apparatus by H. Schadow is constructed on the principle of the vaccine tables in the lymph institutions, and consists of a strong back wall and a broad

* In opposition to the opinion advocated by the supporters of the ritualistic method of slaughtering, that by this manner of blood-letting the quantity of blood obtained is *greater* than when *stupefaction* precedes blood-letting, Goltz has ascertained, for instance, that from an ox weighing 1,575 lbs. when alive 50·54 lbs. of blood has been obtained after killing by the Jewish method, 49·90 lbs. by the use of the shooting-mask, and 45·52 lbs. after the use of the felling-mask. With small beasts the result is still more favourable, for a calf of 135 lbs. when living loses, on an average, 6·15 lbs. of blood by the Jewish method, 6·12 lbs. by stabbing without stupefaction, and 6·84 lbs. by felling with a club, while a sheep of 112 lbs. when living loses in the first case 4·68 lbs., by ordinary killing *without* stupefaction 4·84 lbs., and after being felled with a club 4·88 lbs. These experiments make it clear that it is immaterial, as regards the amount of blood obtained, whether the animal is killed by the Jewish method or is first stupefied before blood-letting: a *better* "*bleeding-out*" does *not* exist than by the Jewish method.

foot-plate, both made of bars on account of their being most easily cleaned. The animal is led on to the foot-plate, and secured, while the forefeet, which have been previously shackled in the stall, are fastened to the rings in the treading-board. After the head is fixed in the usual way, the plate is raised by means of a hoist, whereupon the wall behind

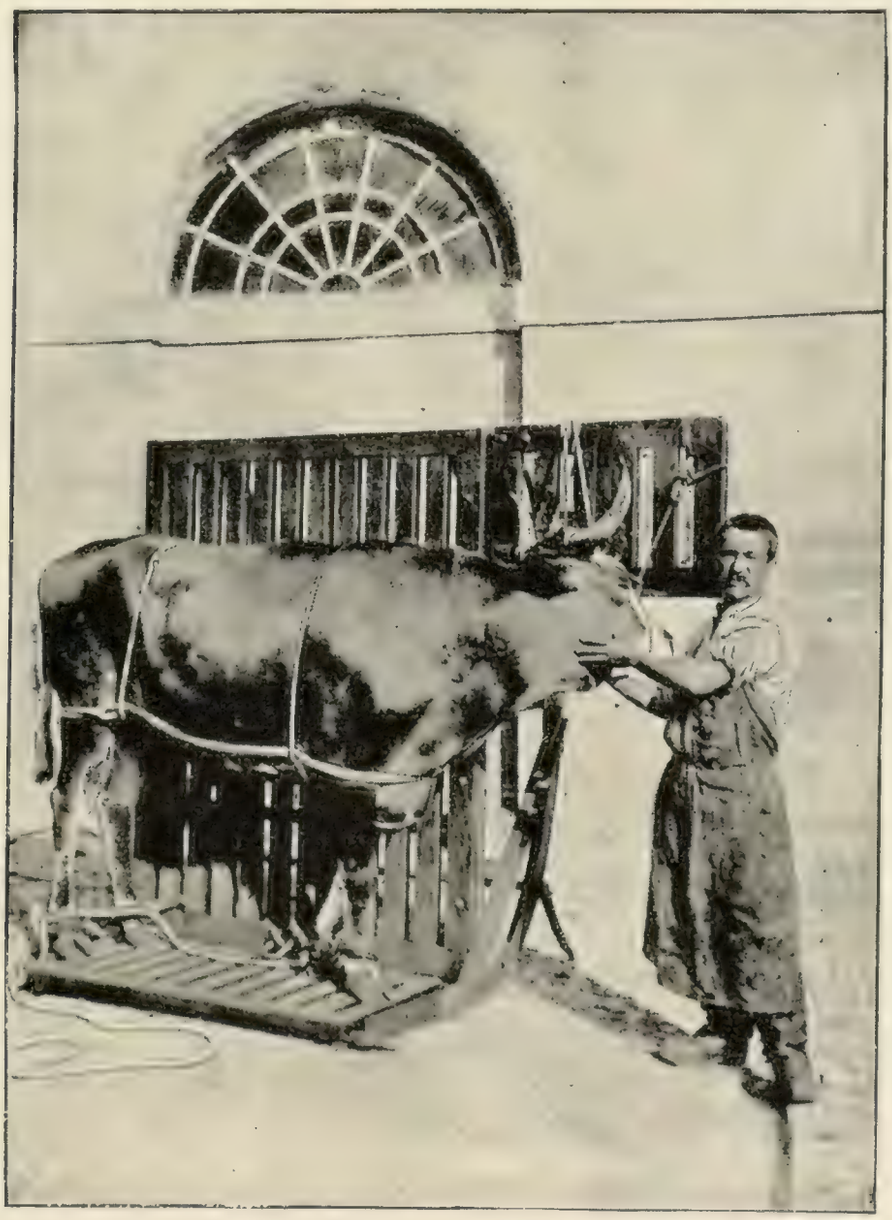


Fig. 71.

revolves round a horizontal axis till the animal rests as if on a table, which is all the better if provided with a support.

After slaughtering by the Jewish method, which is effected with certainty and convenience, the apparatus is again brought to its first position.

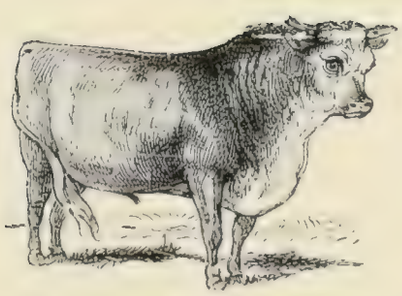
While all the previously described appliances require special arrangements with regard to hoists, etc., this is not so with the newest type patented by C. Trapp, of Strasburg, the slaughter-house medical officer and veterinary surgeon. The whole appliance is made of wooden bars, and consists of a table top 5ft. 10in. high and 8ft. broad, a foot-board 2ft. 6in. broad and 3ft. 3in. long, and a head support 16in. long and the same broad. This boarding is fastened over an iron carrying-frame, and can be laid horizontally on two specially curved ribs, or kept upright by means of two props. In this latter position (see fig. 71, page 147) the animal is led on

Fig. 72.

the foot-board, is held to this by a belt or by ropes, and a throwing-chain with leather straps laid at its feet, but not drawn up. By drawing out a handle, the supports are now loosened, whereupon the formerly upright wall rolls immediately on the two ribs, swinging slightly, and then remains standing horizontal. The foot-board that has fallen down now acts as a support if packed up with a block of wood, while a piece of wood under the opposite side of the rib makes the table immovable (fig. 72). Then follows the

Jewish cut, and the lifeless animal rolls over, causing the wedge to be freed from the rib, and the apparatus, with two or three swings and a powerful jerk, again becomes perpendicular, and remains in this position if the handle is pushed in.

Finally, mention must be made of the throat-pincers of Director Ehrmann, of Mannheim, used in some slaughter-houses. These are for the purpose of pressing the throat together after cutting it in the Jewish manner, so that the blood to be caught is not made unclean by the contents of the stomach. But such an apparatus is not to be recommended either on practical or æsthetic grounds.



CHAPTER VII.

AUXILIARY BUILDINGS.

The following adjoining buildings are not absolutely necessary to every slaughterhouse, but it is important and advisable, for sanitary and economic reasons, that they should be provided :

1. Cold store.
2. Slaughterhouse for horses.
3. "Freibank" (see page 85).
4. Fat and tallow-melting factory.
5. Albumen factory.
6. Skin-cleaning establishment.
7. Hide sheds and hide salting-room.
8. Mince-meat room.
9. Baths.
10. Refuge for dogs.

I. THE COLD STORE.

The Advantages of the Cold Store.—The most important auxiliary building to the slaughterhouse is the cooling house or cold store, offering such important and material advantages that everywhere the butchers are becoming reconciled to the inconveniences and the expenses which compulsory killing and inspection entail, for even in quite small towns such a store can be laid down at little expense. How indispensable the cooling house has become to the butchers may be seen when even the bitterest enemy of compulsory slaughter does not wish to be deprived of the privileges of that establishment. Many butchers have said "the whole slaughterhouse may fall into ruins if only the cold store remains standing!" Schmidt, Mulheim* says with reason : "We are so convinced of the high value of the cold store as regards public health that we can candidly state that a greater service has never been rendered to mankind in the whole domain of the hygiene of dietetics than by the provision of such places."

* "Arch. S. Anim. Nahrungsmittel K.," 1891, p. 51.

The advantages which a cold store offer are so evident, and affect the most varied interests so much, that it actually appears incredible that a slaughterhouse should be built at the present day without one, especially if the town is of any size.

As a matter of fact, there are few instances of this oversight now, and even then arrangements are usually made at the beginning whereby a cold store may easily be added later. But there are also many towns with slaughterhouses which make up for the omission, and subsequently erect such stores, or allow the butchers to do so *on their own account*, for even in smaller institutions the risk of the promoters is small in proportion to the advantages offered, especially when the expenses are shared by several persons.

It is all the more to be wondered at that a butchers' guild should object to the erection of a cold store in their own slaughterhouse premises, in spite of the advantages this would offer to its associates, and in some cases have not provided one until they were *compelled* by the Board of Control or the Corporation of their town. And there are also a considerable number of corporations who persistently refuse to meet the pressing demands of the butchers for the erection of a cold store on their slaughterhouse premises.

Some large slaughterhouses without cold stores are to be found in Kiel, Metz, Bamberg, Hagen, Giessen, Regensburg, Mühlhausen, and, in spite of the fact that quite recently thirty towns have added cold rooms to their establishments, only 220 of the 713 slaughterhouses in Germany are in possession of these stores. And yet it is only by using a cooling room that the butcher is able to carry on his trade to the best advantage, and is able to lay in a store of goods for a considerable time without having to consider the weather, the consumption, etc., and without providing against an outlay for fodder, keep, and stabling. "The cold store," says Behrendt,* "forms the accumulator which equalises the difference for the time being between the supply and demand for meat in the most expedient way."

In mild winter the butcher is not only relieved from the necessity of supplying his ice-cellars with ice, but he can preserve the ice that is there by scientific means for further economic purposes.

* "Ice-making Machines," 3rd edition. Halle, 1894.

The waste of meat in consequence of the state of the weather will be reduced to a minimum; for experiments have proved that immediately such meat has obtained a bad odour by lying a considerable time in a high temperature, it entirely loses this if it is well washed with cold water, carefully dried, and then hung for twenty-four hours in the cold store. Such advantages benefit the country butcher more than anyone, as he is either able to let the meat he has killed in the slaughterhouse hang in the store until required for delivery on market day, or—and this is most important of all—the meat not sold in the market, but which is heated after its long exposure there, instead of having to be driven miles in the heat, thus suffering considerable damage in value and durability, can be allowed to cool down in the cold room.

In Aix-la-Chapelle, Bromberg, Brunswick, and Cleve, meat not killed on the premises can only be hung in the cold store if the space has not been previously bespoken by local butchers.

The slaughter-hall itself does not require to be so large if there is a cold store in its immediate vicinity, because when the meat is killed it can be sent to the store, and room made for the slaughter of more animals.

The cold stores serve the interests of economy in so far as a better estimate of the value of meat that has been objected to may be arrived at.

In some towns it is a rule to keep soft meat standing for twenty-one days in a cold store under public control, in order to see whether or not it is in a state likely to be injurious to health, and if not to sell it in the "Freibank." In Stolp, 5s. is paid for this; in Aix-la-Chapelle 5s. for an ox, 4s. for a cow, and 1s. 6d. for a calf.

Finally, *the quality of the meat* is *much improved* by being kept in a cold store, for it is well known that the meat of freshly-killed animals is tough and dry. It is not fitted for the kitchen until *rigor mortis* sets in, as before this change there is a reaction of lactic acid in the muscles. It is this that gives to meat its taste, which will be so much the better the longer this reaction goes on in the muscles and the connecting tissues. This condition can be attained artificially by laying the meat in wine, vinegar, sour cream, milk, whey, etc. This ripening process can go on in the cold store, while at the same time the meat is kept under conditions unfavourable to putrefaction and anything which will lead to it, for it is well

known that the keeping of meat in *cold*, and at the same time *dry* and *fresh*, air is the best method of meat preservation. It is not only better for culinary purposes, but it is kept in a condition which excludes every possible danger to human health.

The Different Methods of Meat Preservation.—Leaving out of consideration the methods of chemical preservation, there are the following physical methods :

(*a*) Absolute prevention of the penetration of microbes by previously sterilising the meat by heat. (Tinned meat.)

(*b*) Cold.

(*c*) Dryness.

Only the two latter methods are of interest to us, either each alone or combined.

The advantages of preservation by drying are known to us by the methods of the aborigines and hunters of America, the Boers, and the Roumanians. They cut the meat in long thin strips after bleeding it well and taking out all the sinews, sprinkle maize-flour and salt over it, and place it in the rays of the sun long enough for it to become dried to a flexible, but not a putrid, mass (called *pemmican* in North America, *tassa-jo*, *charque* or *charqui* in South America, and *biltong* in South Africa). An analogy is to be found in the embalming of dead bodies in Egypt, where the hot dry air of the country and the fact that the bodies were kept in well ventilated cool rooms, were as powerful factors as the materials used. It is also a known fact that meat is preserved in many parts of the earth for a lengthened period by being hung in airy attics, etc., as for instance in the Engadine, in St. Bernard, in Greenland, South America, etc. Thus it is more or less by mummification that the conditions conducive to putrefaction are made impossible, and which are due primarily to damp and moisture. Also in the process of smoking, dryness plays as important a part as disinfection. Further, putrefaction is materially retarded by a plentiful supply of oxygen. We have already learnt this by the fact known to every layman, that the chimney is a good place in which to hang meat for keeping, if it is to be kept fresh for some time, and this is due to the strong draught of air there. Further, no dry-rot or fungus gathers in a house if there is abundant ventilation, especially under the floor.

Cooling by Means of Ice.—If dry air when in motion possesses strong preservative powers, these are materially intensified if it is also cooled. Cold dry air, when circulated, forms the most perfect mode of preservation; cold alone is not enough, as we see in our ice cellars, unless the meat is packed round with ice until it is practically airtight. Meat kept in cellars that are not well ventilated is soft, flabby, and greasy on the surface, and soon goes bad when exposed to the open air. This decomposition is caused by the presence of microbes, which find in the damp surface a suitable soil for propagation, and a great deal of meat poisoning is due to this unsuitable and imperfect mode of meat preservation.

According to L. Hamilton, fish especially loses its agreeable taste and its firmness if it is laid on ice—it becomes soft, insipid, greasy, and oily; also immediately after the consumption of such fish, appearances of poisoning have been observed.

If the surface is not dried by means of suitable appliances, the conditions permit the growth of the microbes, which create putrefaction, and which always penetrate from outside into the inner parts of the meat, causing decomposition to set in, although similar results are observable when the meat comes from a sick or diseased animal.

It has, however, been observed that meat from animals suffering from tuberculosis also keeps well if placed in the cold room, for some detected at Stolp for sale in the "Freibank" (see page 85) remained fresh in the frozen chamber there for more than three weeks.

The process of putrefaction is greatly assisted by the act that ice cellars are mostly filled with natural instead of with artificial ice, and it is often obtained from pools which contain an enormous quantity of pernicious germs. As has been pointed out, cold does not put an end to their powers of development, and when the warm meat thaws the ice, the bacteria are at once conveyed from the ice to the meat.

The Pernicious Effects of Natural Ice.—The results of bacteriological experiments by Heyroth are of the highest interest. Twenty-five tests were made with ice taken from different waters in Berlin and the neighbourhood. In about 1 ccm. of water there were found from about 2,000 to 14,000 germs, all capable of developing others. Even artificial ice is only pure when pure water is used in its

manufacture. Heyroth obtained ice from twelve different manufacturers in Berlin, and in 1 ccm. of water he got as many as 1,600 germs capable of producing bacteria.

The experiments of C. Bischoff, of Berlin, gave still more unfavourable results. He ascertained by a number of tests of ice taken from different places that in 1 ccm. of natural ice water (melted) there were from 150,000 to 880,000 bacterial germs containing life. The ice prepared from filtered, distilled, or boiled water, is moderately free from noxious germs, and is now most frequently used.

In consequence of the results of these experiments, the following proclamation has been issued by the Government-President at Potsdam and the Chief of Police in Berlin:

"It has been ascertained, by experiments made in the Imperial Office of Public Health, that ice sold for household purposes, even when good overnight, sometimes contains germs dangerous to health unchanged in their power of development. Apparently, the frequent illnesses observed to have arisen after the consumption of drinks cooled by ice are not caused by the coldness of the beverages, as was once thought, but by the germs of disease existing in the ice. These results may arise from solid articles of diet, for instance in butter, cooled by lying on such ice. Therefore the consumption of iced-drinks and other articles of diet which have been cooled by ice in the above fashion, and which may contain properties dangerous to health, is a practice that everyone is strongly warned against."

To obtain *clear* ice in a natural way, a water-pipe should be carried over a wooden frame about two or three storeys high, and provided with several roses. The water falling in fine jets freezes at once in 26° to 28° F., and the icicles so formed increase more and more, becoming in time splendid pillars. In this way clear and cheap ice may be obtained in the direct neighbourhood of the ice-room.

The well-known fact that the flesh of animals which have perished in Northern countries (polar bears and mammoths) has been well kept after remaining enclosed in ice for thousands of years teaches us that natural ice is a good preservative when all contact with air is prevented. Of late years meat has been artificially frozen for the purpose of transporting it long distances, and within the last few years great quantities of frozen meat have come to Europe, especially to England, from America and Australia; still this method has the

great drawback that the meat when thawed very soon decomposes, and must be quickly used unless there are freezing-appliances at the receiving ports, as is the case in England, and in a few cases in Germany. After being again treated in these places the meat can be kept as long as may be desired.

Rooms Cooled by Ice.—Ice rooms are very useful if sufficient ventilation is provided, but this condition is seldom arranged for owing to the generally prevailing fear that the ice will melt too rapidly, while no consideration is given to the fact that by the melting of the ice the air becomes strongly saturated with moisture, which has a deleterious effect on the meat.

To carry off this damp air and replace it by dry air, ventilating appliances have been provided, which make a rapid change of air possible, and consequently the rooms can be kept both cool and dry

Cold rooms of this kind have been erected in quite a number of public slaughterhouses, and, according to the statements of some authorities, they are found to answer very well, although the majority express themselves unfavourably.

These rooms are built in various ways according to the space at disposal, some with ice at the sides or overhead, some a combination of both systems. The general arrangement is to have a building above ground with two principal rooms, the larger being the ice-room and the smaller the meat store; the walls are built very thick, with air spaces, and the ventilation and circulation flues connecting the rooms with each other are formed on the walls. The air coming from the ice-room (which is not at a higher level than the other) falls to the floor of the store and forces the warmer air upwards through outlet flues and chimneys, and consequently the store is not only well cooled but the thorough ventilation keeps it perfectly dry.

Ice-rooms of this kind have already been built at Kattowitz, Waldenburg, floor area of cool room 535 square feet; Landshut, 535 square feet; Myslowitz, 1,775 square feet; Ohlau, 540 square feet; Brieg, 910 square feet; Lobau, 920 square feet; Patschkau, 640 square feet; Frankenstein, 650 square feet; Wittenberge, 1,700 square feet; Trebnitz, 700 square feet; Freiberg, 740 square feet; Oppeln, 2,550 square feet; Namslau, 550 square feet; Spremberg, 900 square feet; Wittstock, 670 square feet; while they are under consideration for Kolberg, Gratz, Neumarkt, and Lyk.

The ice-house recently finished in Hayman for £1,350 was not used at all in 1898 owing to a scarcity of ice.

According to a statement made by the builder, the temperature is kept at about 36° to 40° F., and eighty-three to eighty-five per cent. of moisture, as indicated by the hygrometer.

Cost of Erection and Working.—A cold store of about 5,500 cubic feet capacity costs £1,000 to erect, and requires about £30 worth of ice to fill it, while a larger establishment like that of Kattowitz with forty-seven divisions, having about 2,550 square feet of floor space, costs £2,500 to build, the maintenance having run to about £125 per annum. The establishment is now supplied with air-cooling-plant which cost £10,000.

Objections have been raised in times past to the erection of ice-houses on account of the cost, but they have become so much cheaper to build and maintain that they have come to be looked upon with more favour. Bucher, however, points out that ice-rooms are not satisfactory, and shows that in the Knauer ice-house at Lobau the air undergoes an increasing deterioration as the blocks of ice melt. "By the melting of the ice the joists (on which the ice rests) are laid wholly or partly bare. These now form a suitable growing ground for all sorts of bacteria owing to their moist condition, and they gradually get decomposed, while slime and dirt gather upon them. This decomposition adds to the possibility of deterioration of the air already polluted, and thus the bacteria breed more rapidly and fill the air, which carries these impurities about, and causes injury to the meat which it is intended to preserve. Added to these evils, the cost of erection is quite as much as a complete installation with mechanical refrigeration. The latter, however, includes pumps for raising the water and for warming required in the building, as well as means for heating it, for which an allowance must be made in making a comparison with a natural ice-house."

To keep ice for a long time, it must be in large quantities, and so tightly packed together that all the spaces are filled up. This is managed by rubbing off all snow from the ice, cutting it in rectangular blocks, and filling all crevices with the broken pieces. It is of great importance to have the uppermost surface always as smooth as possible. The lower blocks of ice should be supported about 8in. above the ground, so that there is room below for

drainage. Old rails answer very well for this purpose if covered with a sufficient quantity of leaves or straw.

E. Moritz's opinion on ice-houses is similar to that of Bucher, for he says :

"In an ice-house the temperature is always over 32° Fahr. Indeed, on account of the air brought in along with the meat it may rise to 38° and 40°. This gets in a saturated condition, and the warm meat fills the air with more moisture, tending to produce supersaturation.

"Even when enormous quantities of fresh air are brought in to make up for this the nearly saturated air remains in the room, and the moisture from the incoming air will cause condensation on the walls, the roof, and the already cooled meat, and so produce a favourable growing ground for the propagation of bacteria. If the temperature of the cold room is from 38° to 40° F., the moisture in the air must not exceed seventy per cent. of saturation. Thirty-seven thousand cubic feet of air must not contain more than nine pounds of aqueous vapour. It is then absolutely necessary that the air be cooled to 30° to 28° F. before any moisture can be deposited, because at this temperature it contains exactly the quantity of water required to bring it to a saturated condition To cool the air to such a low temperature with brine pipes, as used in mechanical refrigeration, the brine must be still lower, say 25° to 23° F. It is therefore evident that cooling by means of ice does not meet the demands required for a satisfactory meat refrigerator."

Direct contact between the air from the ice and the meat can be avoided if the house is made two storeys high, the lower room being used as the meat store, and the upper room for the ice. At Buda-Pesth there is such an arrangement, and the floor between the rooms is formed of corrugated iron sheets, so that the air cooled on the iron plates sinks to the ground, while the warmer air rises upwards, gets cooled, and descends again, and so on. The condensed water is caught and led off by the Brainard system.

An illustration of a system in which cooling can be effected by means of ice as well as by a refrigerating machine is given in figs. 73 and 74.

The meat cooled to the temperature of the air is brought into the cool room *(a)*, which is in connection with ice-rooms, so that it is kept at a low temperature. The ice-room (*c*) is kept closed, and the

ice is not touched. The flooring of this room is corrugated sheet-iron, so that the cooling of the salting cellars (*b*) below is effected by the circulation of the air, as previously described. The ice-room (*d*) is used chiefly for the ice required for other purposes of the business.

In a front cellar stands the cooling-apparatus (*f*) (fig. 73), consisting of a tank with a perforated plate above some tubes through which the air can pass and so get cooled down. Ice is packed on the perforated plate, obtained from the ice-room (*d*), and the tank gets filled with cool water from the melting ice which is continually being renewed. A fan (*g*) draws the air from the various rooms to be cooled, and forces it through the cooling apparatus (*f*), where it gets cooled, and then is sent back to the rooms.

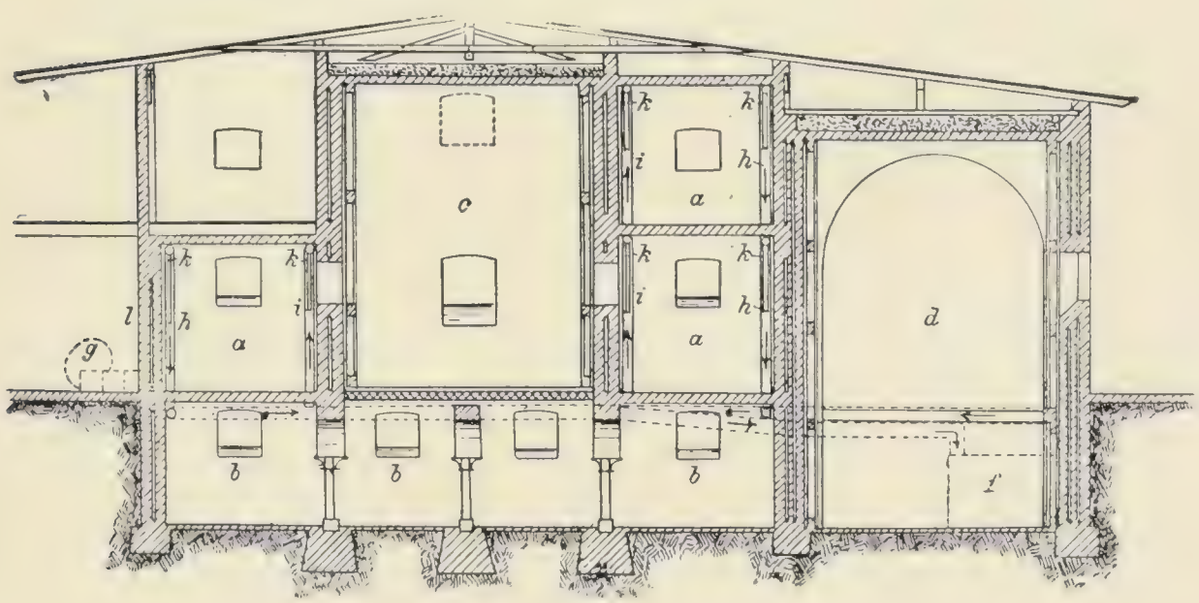


Fig. 73

In the cold rooms a number of vertical perforated tubes hang down from the walls, and the air is sucked in through those marked (*h*) and blown out through those marked (*i*), and is thus compelled to travel between the meat. The inlet and outlet of air can be regulated by means of butterfly valves. By the pipe (*l*) fresh air from outside can be admitted into the cold room for renewing the rest. If a refrigerating machine is used, the cooling-apparatus made specially for it takes the place of the apparatus described here (*f*).

Refrigerating Machines.—All the systems previously described require ice; but this may often fail after a mild winter when little ice is produced, or during a hot summer when the stores are all too quickly depleted. This will enable us more readily to understand

with what pleasure those requiring ice hailed the invention of the first refrigerating machine, being glad to have their little private winter in their own houses, and to be emancipated for ever from the caprices of the clerk of the weather.

Such machines are now not only used for isolated buildings, but in America and elsewhere they have central refrigerator works, where ice can be obtained, but there are also stores for all kinds of produce kept at an equal and suitable temperature. It would take too much space to go fully into details and show for what purposes artificially prepared ice can be used.

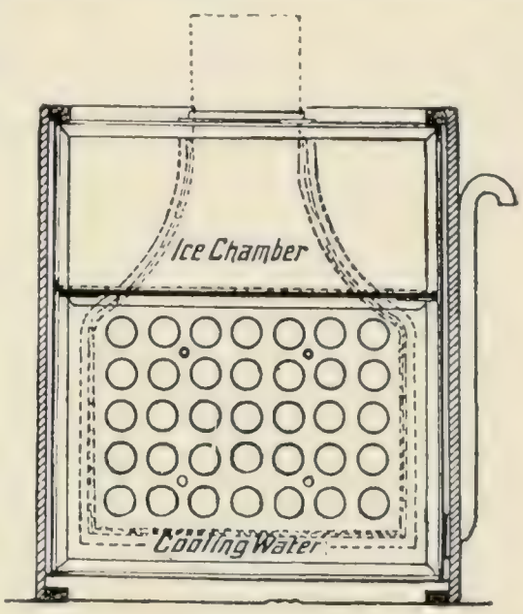


Fig 74.

The first refrigerating machine produced in Europe for industrial purposes was invented by Carré, and exhibited in the Paris Exhibition of 1867. Since that time the various inventors and manufacturers have made such progress that we are now in possession of a number of different systems.

We divide these into *two large groups:* 1, *cold air machines;* 2, *vapour machines*, the latter being subdivided into those operating by compression, and those in which the principle of absorption is employed.

1. The cold air machines are used in only a few slaughter-houses. The air is first compressed, and, after cooling, it is allowed to expand, and thereby absorb the heat necessary to allow this expansion, from itself and its surroundings. By the repetition of this process a tolerably low temperature may be obtained. It is claimed as a special merit of this machine, that its use is absolutely without danger, as it works without chemicals, and on this ground is admirably adapted as a refrigerator for use on board ship, as it cannot fail for want of the necessary cooling medium.

2. Vapour Machines.—These are now mostly used for cold-store purposes, more especially compression machines, the absorption machine being seldom employed.

All vapour machines are based on the principle that liquids absorb heat when passing into a vapour. They abstract the heat

necessary for this evaporation from their surroundings, and in consequence cool them. The following refrigerants have been employed: Ammonia (NH_3), sulphurous acid (SO_2), carbonic acid (CO_2), water, methylated spirit, ether, Pictet fluid, etc.*

The liquids, after changing into gas, are again converted into a liquid state for use again by either absorption or compression.

Absorption is the physical property by which certain bodies are absorbed by water under certain conditions, brought about by regulating the temperature and pressure. The vapour so absorbed can be driven from the liquor by heat, while compression and cooling result in condensation.

(*a*). The Compression Machine.—Fig. 75 shows the three principal parts of this machine—the compressor, the condenser, and the evaporator. The compressor (marked *p*) draws in the vapour from the evaporator, and after compression delivers it to the condenser. It is fitted with automatic valves; those for the suction valves are marked S_1 and S_2, and the delivery valves are D_1 and D_2. The delivery pipe C C leads from the compressor into the condenser, and is connected to a coil of pipes surrounded by cold water, which enters the tank by A and leaves it by B. There is an arrangement inside the condenser, not shown in the illustration, which keeps up a constant movement of the water pumped through. The valve R regulates the flow of the liquid from the condenser into the coil of the evaporator V. The latter is made similar to the condenser, but

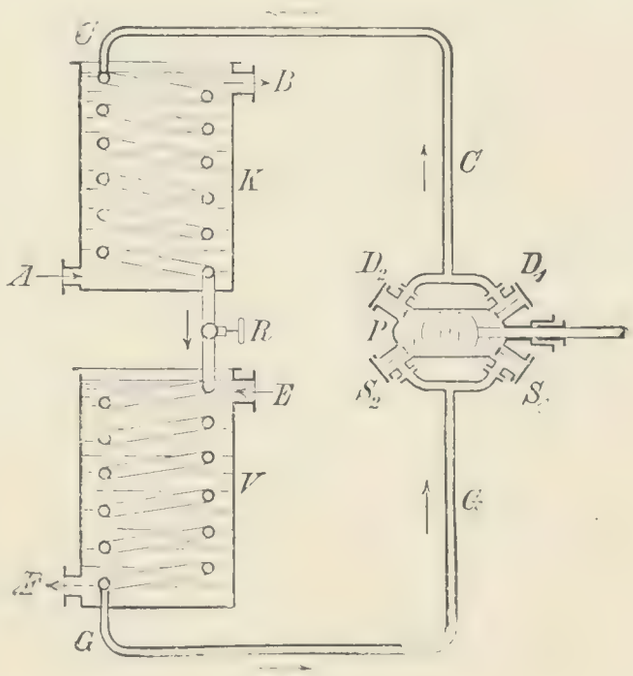


Fig. 75.

* To prevent the inhalation of these vapours, in case of accident it is advisable to have at hand appliances for protecting the workmen when required; in fact, their use is enforced by accident insurance companies. They are in the form of respirators, spectacles, gloves, etc. (see appendix). The best known of these appliances is a smoke-helmet, and this, which *thoroughly* protects the head, is kept ready in many slaughterhouses.

instead of water in the tank there is a solution of salt,* entering by E and passing out by F. This brine, after being cooled in the evaporator to about 18° to 14° F., is forced by special pumps through the cooling apparatus in the rooms, and returns into the evaporator to be re-cooled, while the vapour in the coils is passed by the suction pipe G G to the compressor P, to begin its course anew.

Owing to the low temperature in the evaporator and the suction pipe, these must be protected against the leakage of heat from outside by some insulating material, such as cork dust, etc.

Besides the three principal parts described above, most machines are provided with an additional part called the "cooler" (air-cooling apparatus).

The expenditure of power and the quantity of cool water used are regulated by the temperature of the former and the quantity of vapour required to produce the cooling effect. The higher the temperature of the water, the greater the expenditure of power and the greater the quantity of water necessary. Some manufacturers therefore use special apparatus, so that the machines they construct only use a small quantity of cooling water. Many of these apparatus are arranged to cool the water for re-use, and will be described in connection with the cooling machines themselves.

Some may conveniently be mentioned now, as the firms who make them do not make refrigerating machinery. First come Zschocke's patent hurdles and Gebr. Körting's cooling tower.

The former consists of a simple framework, provided with hurdles, the latter being so constructed that the water runs over this surface in thin sheets. On the underside of these hurdles there are numerous projections which separate the water into drops and pass it on to the next hurdle, and so it is passed on from hurdle to hurdle until there is a fine artificial rain made, which comes into intimate contact with the outside air, the openings between each hurdle giving ample opportunity for free draughts

* As is well known, fresh water freezes at zero, at which point it is hardly possible for salt water to be frozen. Brine usually contains about twenty to twenty-five per cent. of salt, and must have salt added to it from time to time as the moisture withdrawn from the cold room is absorbed, when any arrangement is adopted by which the air actually comes in contact with the brine. Sometimes a quarter per cent. petroleum is added, but this must be stored in the open air for some time, and constantly stirred up, or else if left for even a short time a strong odour of petroleum will be noticeable in the meat store. Experiments have been made with fuller's earth but this produces a deposit in the pipes and the brine pump.

of air. These hurdles can also be built up in the form of a tower.

A still greater evaporation surface is obtained by a frame filled with bundles of brushwood (see fig. 76).

Another type which has been fitted up in the slaughter-house at Magdeburg is made thus: By means of a "douche" the water is sprayed very finely on to a tower made of slabs of wood, and is so thoroughly cooled as it drops down the tower amongst the air rushing in between the laths that it can be

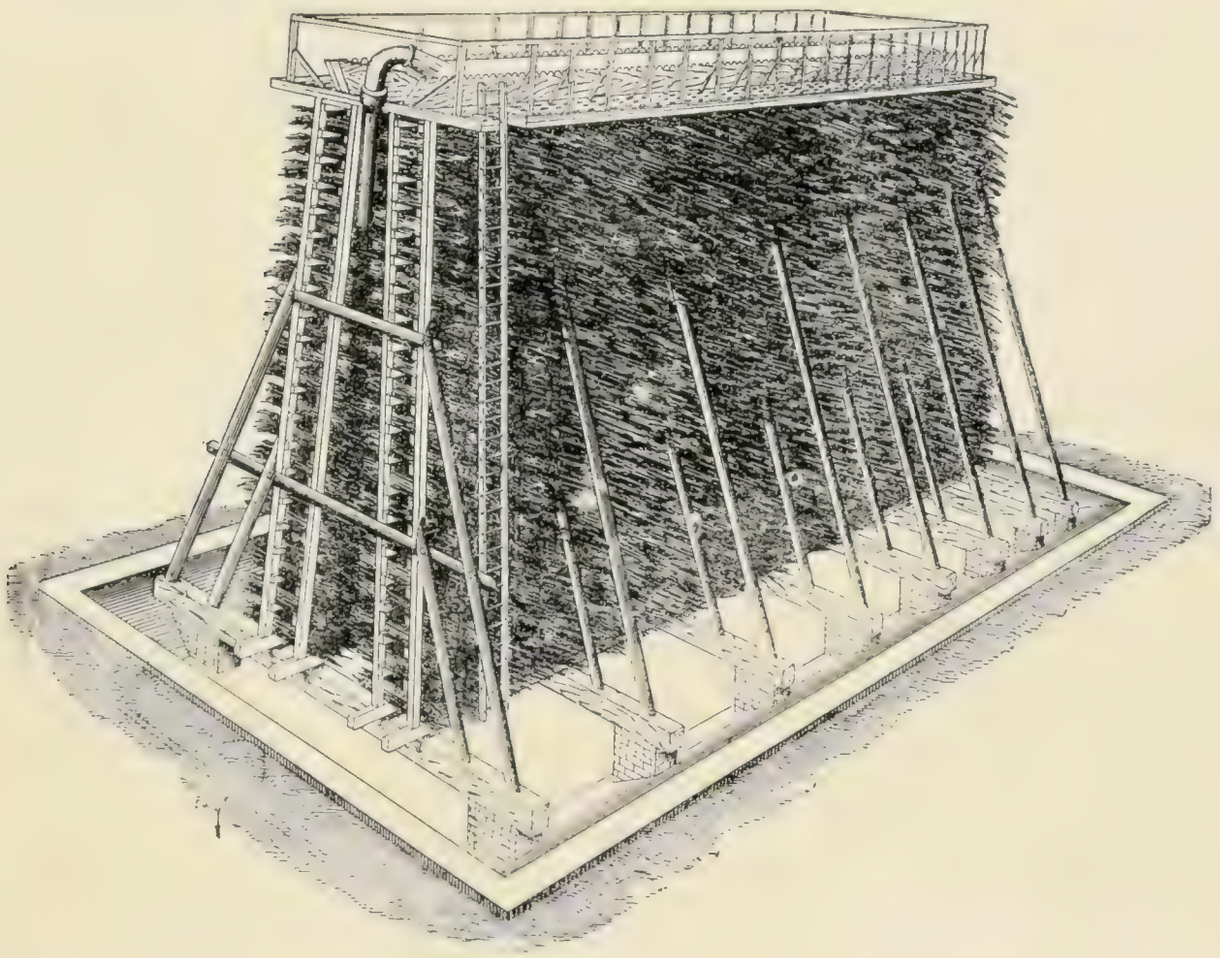


Fig 76.

drawn from the tank below the tower perfectly cool, and be used over again for the same purpose as before.

The cool water flows from the condenser at a temperature some degrees higher than on entering, and can be used for other purposes, such as the boiler feed or general use in the building. For the latter it must be pumped into a high cistern to command the service tanks.

The cold brine from the evaporator is employed for the actual cooling of the rooms before it goes into the air-cooling apparatus,

so that the cooling effect of the evaporator reduces the temperature of the air of the room, and at the same time purifies and dries it.

Two types of air coolers are used—that known as "direct expansion," in which the air is blown over the coils of the evaporator; in the other form the evaporator cools the brine, and the air is brought into direct contact therewith.

With regard to the *cooling* of the air, the action of the cooling surface does not require any further description. Naturally, the cold bodies become warmer by contact with the warm air, and thus the quantity of heat given off within a certain time depends on the size of the cooling surface and the difference of temperature between it and the air.

The *drying* of the air is a necessary consequence of the cooling process, for air contains less aqueous vapour the lower its temperature becomes, and the condensation of the aqueous vapour is greater according to the extent to which the air is cooled. This condensation takes place on the cooling surface. If the latter is metallic, it becomes covered with snow; if it consists of brine, the moisture is absorbed.

The *cleansing** of the air is practically a washing process, done *indirectly* by the cooling, and *directly* by the contact of the air with the brine. The first may be explained by the fact that as the aqueous vapour in the air is condensed it forms particles of water on the mechanically- conveyed bodies that are also in it, whether they be of an organic or an inorganic nature, and with these particles of water the impurities are transmitted to the cooling surface, and are thus removed from the air.

But if brine is used, then the impurities are held fast by adhesion, and the air is washed more completely. *This shows the undeniable excellence of the method of cooling by direct contact between air and brine.*

The circulation of the air in the cold room is effected by means of fans, which are placed in the room, and connected with air-ducts in the following manner. The warm and impure air rises upwards, and is sucked into pipes (of galvanised iron or wood) in the roof, and is led to the cooling apparatus, where it is cleaned, cooled, and dried, and after this process is perfected it is conducted through a second

*The Danish physiologist Hausen has invented an apparatus for laboratory experiments, by means of which the air is almost entirely freed from all bacteria and particles of dust.

network of ducts, and blown into the cold-room again. These delivery ducts differ from the former in that a considerable number of branch ducts are led off from the principal duct with outlets on their under surface, their number and size being increased the further they are from the fan, so that even the most distant corners of the cold room are supplied with a plentiful flow of fresh air.

In this way the cold-room maintains its necessary temperature—on an average about 36° to 40° F., with about seventy per cent. of moisture, pure and dry.

Another, but not so desirable, method of cooling is by evaporating the refrigerant itself in a system of pipes in the cold-room. The warm air, rising upwards, is cooled, and falls to the ground again, and so on. But as the moisture contained in the air of the cold-room is deposited on the pipes in the form of frost, this, by its gradual accumulation, reduces the transmission of heat, and while the air in the cold-room is certainly low in temperature, it is also damp, owing to the ever-increasing quantity of frost, which remains firm in consistence, and may thus very probably retain all manner of microbes, from which it cannot afterwards be freed.

The cooling machines, which come next under discussion, closely resemble the machine previously described as far as regards three of the apparatus (compressor, condenser, and evaporator), but there is such a difference in the cooling-apparatus that a special description will be given of each.

If, however, an air-cooling apparatus is required, whatever its construction may be, it must always be on the principle of limiting to a minimum the work of the fans in circulating the air by avoiding change of direction and friction.

The following manufacturers have used *ammonia* as a cooling medium and the *compression system:*

1. The Linde Ice Machine Company, of Wiesbaden and London.—Dr. Linde has produced four different cooling apparatus, which are all in use.

The oldest of these is so constructed that the evaporator is used directly as an air-cooler. It is in use in the slaughterhouses of Bromberg, Celle, Erlangen, Frankenburg, Kaiserlautern, Muiden, Stassfurt, and Stargard's. An undeniable merit of this system is the abandoning of the use of brine, which was formerly employed for the transmission of heat from the air to the ammonia, and the

absence of the pump used to keep the solution of salt circulating through the cooler. The spiral evaporator for the ammonia is enclosed in the air duct and placed in, near, or over the cold room, and the air is circulated through it by means of a fan. In consequence of the cooling of the air, the cool surface becomes covered with a layer of snow, which as it increases is always interfering more and more with the absorption of heat through the walls of the pipes. To prevent this, the different coils are changed over to receive the warm compressed ammonia circulating through the machine, which melts the layer of snow and condenses the gas.

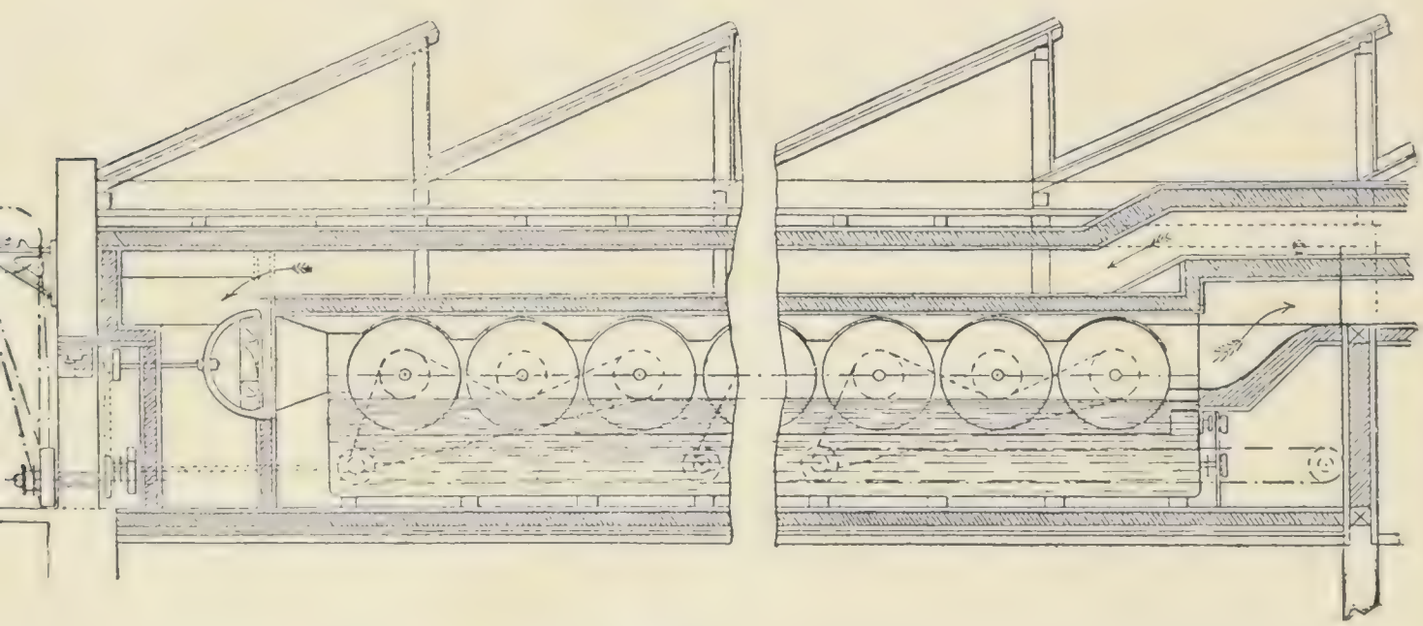


Fig. 77.

But the preference must be given to the three earlier machines by the same inventor, because of their simplicity and greater effect.

A number of sheet-metal discs are fixed on a shaft lying horizontally (see fig. 77), so that they are each some little distance apart, and at their lower edge dip into a tank filled with the cold brine. These discs revolve slowly, and become covered with a thin layer of brine, and thus form a series of narrow canals, through which the air is blown. The brine cooler, the evaporator, and the air cooler form a single apparatus, the evaporator coils being directly underneath the system of discs and in the tank containing the brine.

The special advantage of this rotatory apparatus is the small resistance offered to the air passing through it. There is thus a reduction in the power absorbed by the fan. Most of the cold

stores erected by Linde (on the Continent) are fitted with this air-cooling apparatus.

Of late some evaporators with brine sprays have been used, and combine the evaporators and air coolers. (See fig. 78, longitudinal section; 79, transverse section; 80, ground plan.

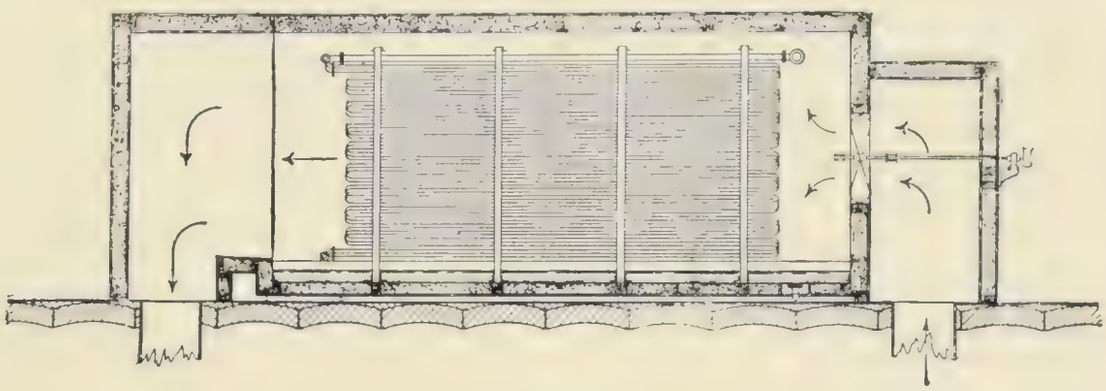


Fig. 78.

The refrigerator coils, in which the fluid ammonia flows to be evaporated, are arranged vertically, and over each a pipe is led, out of which the brine flows over the whole length of the coil simultaneously, and then drops down from one layer of pipes to the other. The brine is collected in a tank for the purpose, out of which it is drawn by a pump, and is again sent through the pipes as before. The whole apparatus, which stands *over* the cold room, is enclosed in a well insulated chamber, and the air is driven through it into the cool-house air by means of fans. The cooling effect is thus first produced in the thin layer of brine with which the coils are covered, and then in the air.

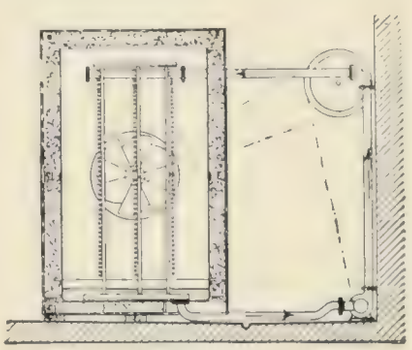


Fig. 79.

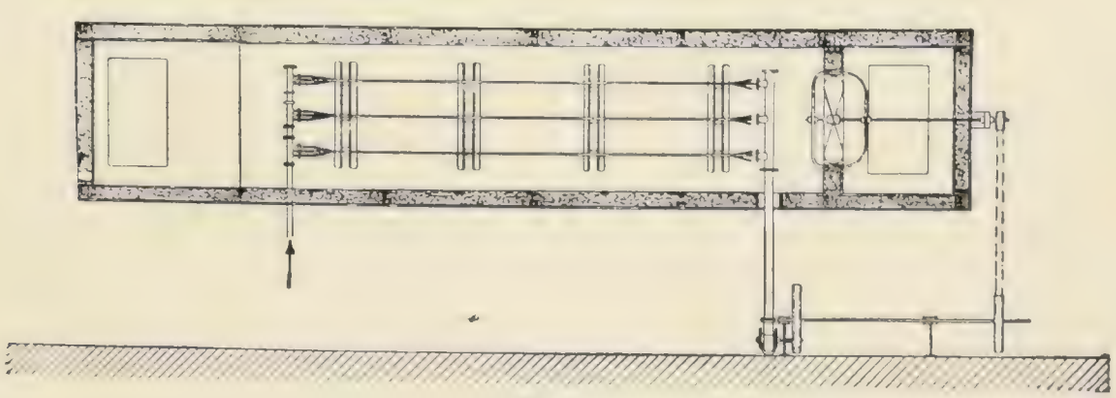


Fig. 80.

This construction has the following advantages:

1. In consequence of the small quantity of brine required, the expenditure of energy in the circulation-pump is small.
2. The air passes through the apparatus without change of direction and in great transverse sections, and thus but little power is required for the fans.
3. All parts of the apparatus are accessible as the coils lie apart, each coil being easily inspected and kept clean.
4. The absorption of heat by the evaporating medium is as direct as possible.

Coolers of this type have been put into the slaughterhouses in Aix-la-Chapelle, Bochum, Cassel, Danzig, Hamburg, Heidelberg, Landau, and Stade. In some new establishments there are shower coolers, by means of which the brine is made to fall from a height of several yards like a close and heavy downfall of rain, and the air to be cooled has to pass through this. According to statements of the manufacturers, this apparatus is somewhat cheaper than that with the revolving discs. The pumping for the shower cooler requires more power, as the falling brine must be raised again, hence it is more expensive to work than the apparatus with the revolving discs, so that both appliances cost about the same in the long run. The shower cooler has been fitted up in Barmen, Frankfurt-a.-Main, Neuruppin, Summerfeld, Zeitz, and Ziegenfals.

Instead of the submerged ammonia condenser as used in the earliest manufactured machines, we now find the open evaporative type, usually placed on the roof of the engine-house.

It must be borne in mind that there should be a duct from the open air to the suction side of the fan through which fresh air can be drawn and led into the cool-room* when required. This duct can also be made use of if the cold-room is needed in winter, when cold air from outside alone is blown into it.

In order to be able to *warm* the air in winter, simple steam coils are arranged on the delivery-side of the fan. This method has not been found to answer well in very cold winters, because the air blown into the cold-room through the lower air-duct rises quickly upwards

* A connection of this kind between the cold-room and the outside air, without any communication with the fan, is strongly recommended, especially if care is taken that the opening can be easily and tightly closed every time after it is used. This can be done by building in air-shafts which lead out to the roof and which can be closed at the bottom. These air-shafts should be of iron or stoneware, and must be of ample area with a suitable cowl at the roof.

and is led away by the upper duct without producing much effect, and the air remains almost unchanged in the lower part of the room. To obtain a sufficient supply of air for a very cold winter's day, there must be a third air-duct laid on the floor of the cold-room for carrying off the warm air, at the same time that some passes by the suction duct. Small gas-stoves can be placed in different parts of the cold-room and be removed when they are not in use, while the third air-duct on the floor of the room can not be lifted without some damage being done, and it is a serious inconvenience to the business going on in the hall, unless arranged for in the first instance so as to be sunk in the floor itself.

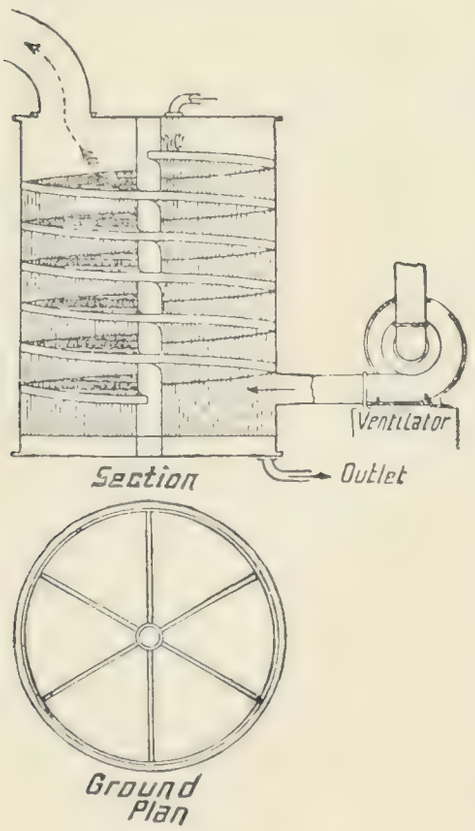


Fig. 81.

In Leipzig there is a special arrangement made, whereby it is possible to keep the air in winter at a temperature of from 32° to 41° F., and dry. This has had the most satisfactory results, has cost very little, and is managed in this way. According to the temperature outside, and the moisture of the air in the vestibule of the cold room, a cooling and then a drying results, one after the other, and therefore a determined heat of the air led in is attained, and along with that an increase in the capability of absorbing moisture.

2. Osenbrück und Co. — The cooling of the air is effected in a cylindrical vessel closed at the top and bottom (fig. 81), in which there is a cast-iron endless screw fixed on a shaft in the middle of the cylinder, and provided on the upper side with radial ribs of such a height that the surface is always covered with brine, pumped into the apparatus from above. There are also several holes to allow some of the brine to flow through and form a shower at the lower end of the last coil of the worm, and a fan at the lower end compels the air to pass through the shower and over the surfaces of the worm, whereby the washing of the air is effected.

The brine collected at the bottom of the cooling apparatus is again passed through the evaporator by means of a pump, is there cooled, and returned.

3. Germania Engineering Works.

The specialities of this firm are their evaporative condensers and water coolers, as shown in fig. 82 and at E, fig. 83. These are fitted up on the roof of the engine-house, and require no tank, and there is also the advantage due to the rapid circulation of air to which the condenser is exposed, whereby refrigerating action of the water is greatly assisted, so that the water consumed is materially lessened. If the water is to be re-cooled, it can be done, as has been already pointed out, by means of brush-wood coolers. Figs. 82 and 83 (pages 170-171) show the special method followed by this company, and when it is fitted up along with the condenser the latter may be either enclosed or open. In the former case, the warmed cooling-water running from the condenser is raised to the cooler by means of a pump. In the latter case, the condenser stands under the cooler, so that the action of the air is continued on the coils of the condenser. The warmed water flows from a tank to a pump, from whence it is raised to the cooler and passes again over the condenser. The additional fresh water required is only five per cent. under favourable conditions, and ten per cent. in unfavourable circumstances.

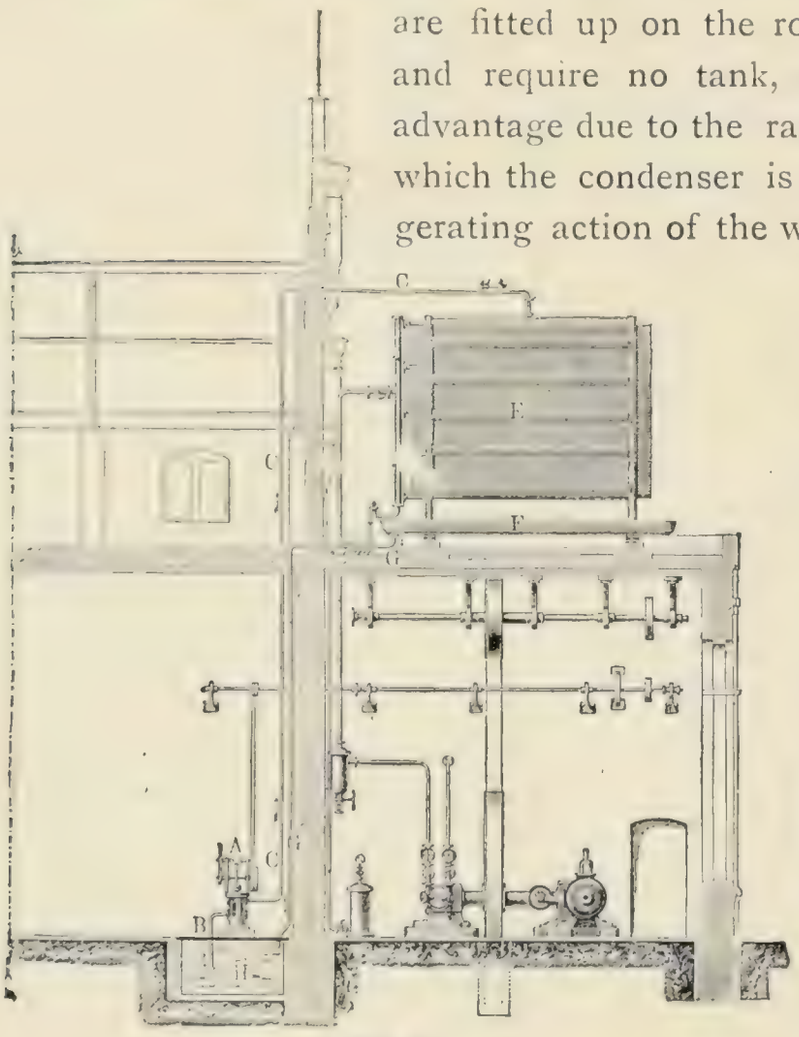


Fig. 82

4. Maschinen-Anstalt Humboldt. — The air coolers already described have been objected to because the air can only

be forced through them at a certain speed, otherwise little particles of brine are carried along with it into the cold-room; and further because, as has been already mentioned, the strength of the brine gets reduced by absorbing the moisture from the air. These drawbacks have been as far as possible avoided in the Fixary refrigerator.

This (see figs. 86, 87, 88, page 174) consists of two walled chambers containing evaporator coils, which are separated from

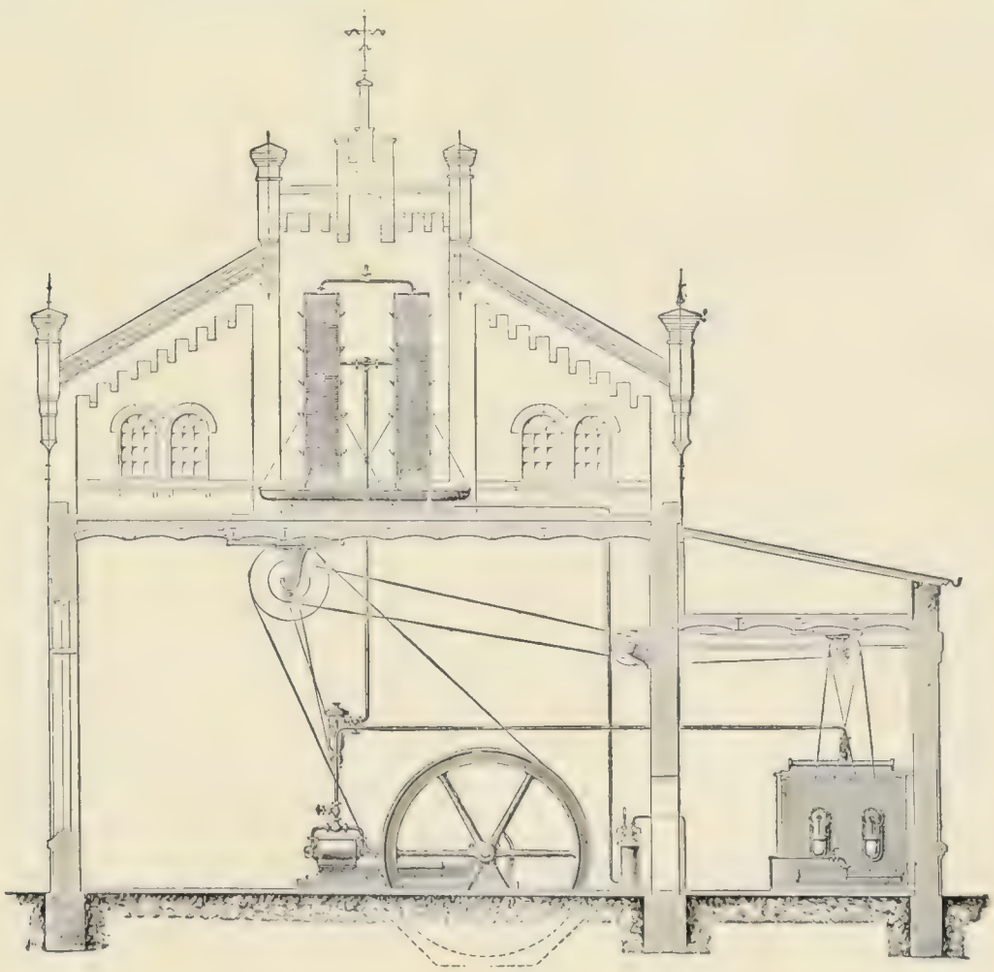


Fig. 83.

each other by a space forming a by-pass duct. The arrows in the illustrations show the course taken by the air coming from the cold-room. The action can be best explained by reference to the illustrations, supposing the apparatus to be set so that when the coils in one chamber contain no liquid ammonia and become encrusted with hoar frost, due to evaporation of the ammonia that has taken place, and at the same time the coils in Chamber II. contain liquid ammonia for evaporation. Then the warm air withdrawn from the cold-room by means of a fan is made to pass over the coils covered with hoar-frost (which is thus melted), entering Chamber II.

much cooler, and is there still further cooled by contact with the colder coils, depositing its moisture and all injurious constituents in the form of frost, while the air itself returns to the room cold-dry and cleansed.

This firm make their air-ducts of tongued and grooved boards, saturated with chloride of zinc or protosulphate of iron (green vitriol, copperas).

5. G. Kuhn.—The refrigerator consists of a more or less large number of galvanised iron plates hung close to each other and surmounted by a tank, from which cold brine flows down both sides

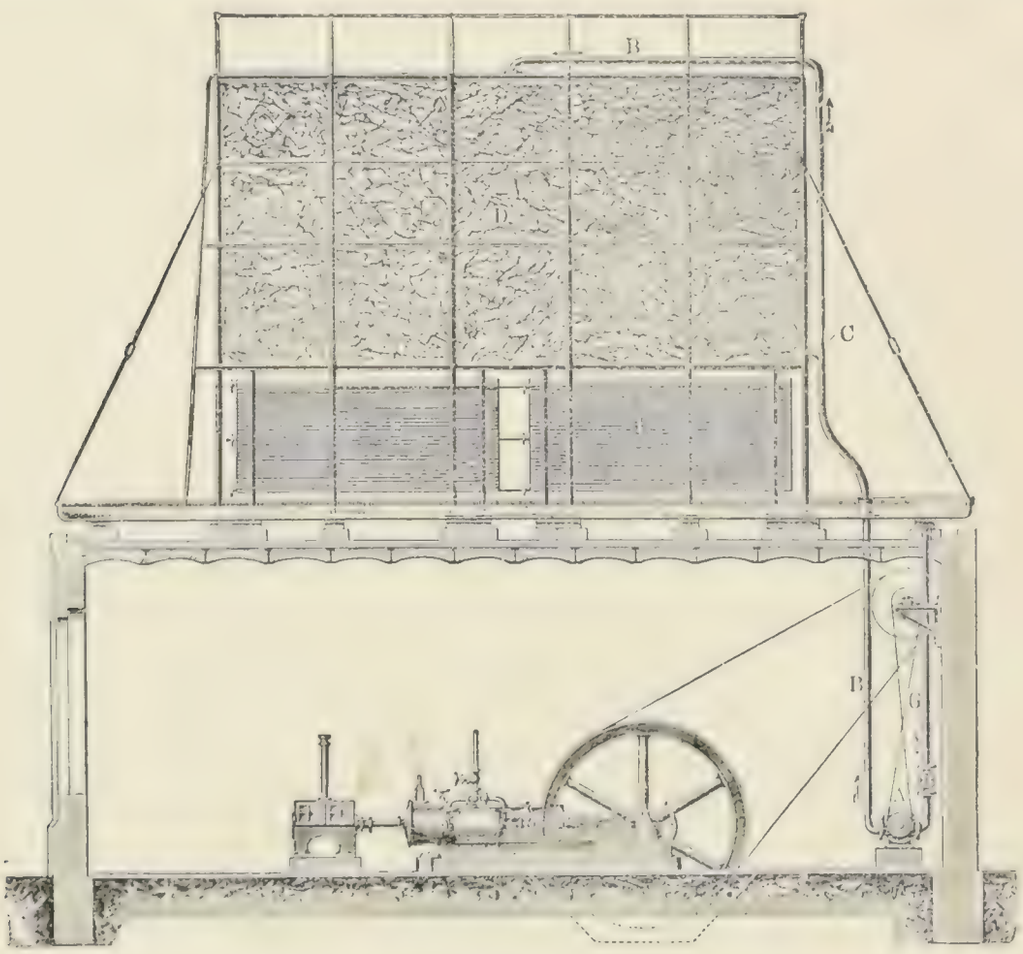


Fig. 84.

into another tank underneath to be again cooled in the evaporator. The air is blown between the plates, and is thus cooled.

Such a refrigerator is already in operation in the slaughterhouse at Göppingen (2,592 sq. ft. and 1 cwt. of ice an hour), and one is being put up also in Frankfurt-a.-M.

6. Wegelin und Hübner.—This firm previously built cooling machines on the absorption system, but now make compression machines employing ammonia and sulphurous acid. They

also use wooden ducts saturated with chloride of zinc. The cooling-apparatus (fig. 89) consists of cylindrical vessels fitted with a series of flat plates, over which brine flows, and whence it is forced by means of a pump. It falls over the plates in a cascade and forms ring-shaped films, through which the air must pass on its way upwards. Now as the air must travel through *several* air-coolers (the number of which depends on the size of the space to be cooled), it is thus brought in different ways into the closest contact with the cold brine. The brine collects at the bottom of the cooling apparatus and runs down into the evaporator, and is then re-cooled and used again. Evaporator and cooler are also made combined in one, and the brine streams over the coils of the evaporator in a thin sheet, collects below, is drawn off by a circulation-pump, and is again delivered over the evaporator. A fan in the front of the apparatus drives the air through the cascade of cold brine.

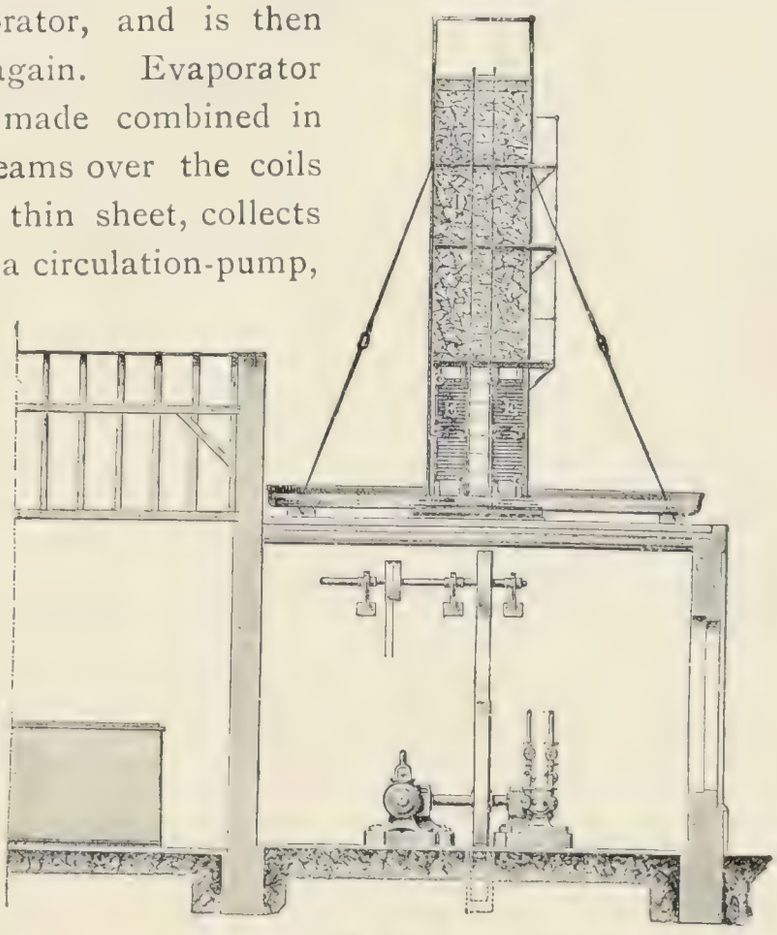


Fig. 85.

7. C. G. Humboldt, jun. — This firm have fitted up machines in the slaughterhouses at Riesa and Nicolai.

The refrigerator consists principally of a large number of plates of galvanised sheet-iron set on an incline and arranged in stages. The brine runs over these, and the air from the cool-house travels in a counter-current and is cooled. Besides this, there is a fore-cooling apparatus, constructed as a heat exchanger, and consisting of plates ranged over each other in a peculiar manner and at a considerable distance apart. Between these there blows the used but still cold outlet air and the warm fresh air coming from outside, so that the latter is cooled down about 20° F. This cooled *fresh* air is led by a duct to the cooling-apparatus of the machine, which is directly

adjoining the other, and where it is still further cooled. The foul, vitiated air is continually being removed by a separate fan, while the *fresh air* can be supplied to the cold-room in any quantity that is desired. The continual renewal of air can be regulated most

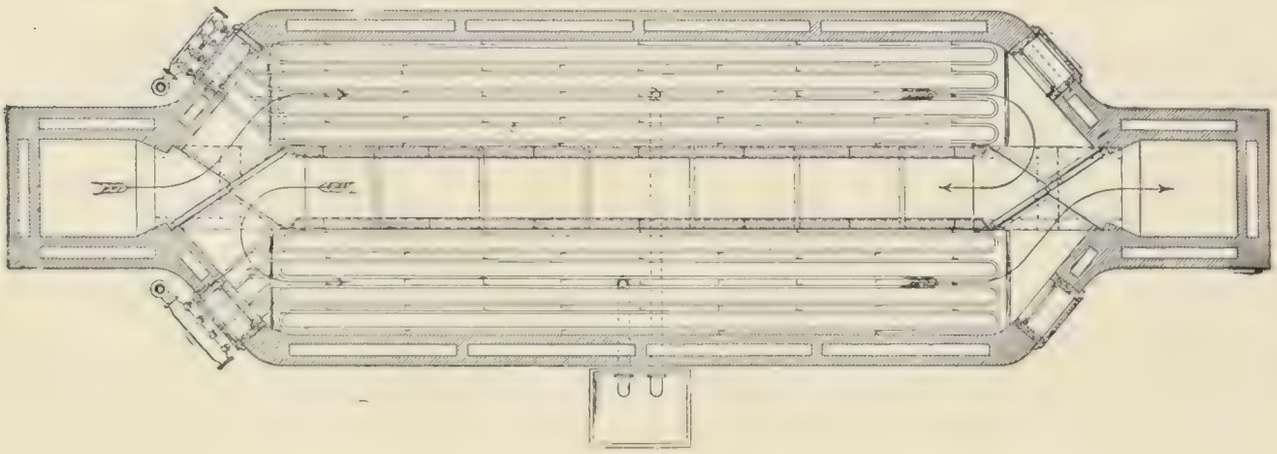


Fig. 86.

accurately by butterfly valves in the ducts. The latter are made of wood.

Compression Machines with Carbonic Acid.—Carbonic acid is another medium used for compression machines. According to calculations made by Professor Zenner, carbonic acid requires less compression space than ether, sulphurous acid, methylated spirit

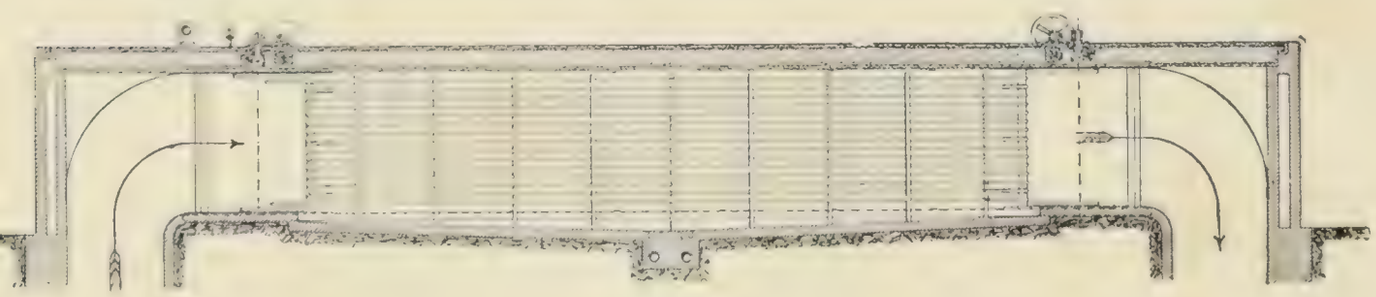


Fig. 87.

and methyl-chloride, or ammonia, and, as a large compressor loses more by friction than a smaller one, there ought to be some saving of power in favour of the latter. Some inventors have therefore endeavoured to find refrigerants which will allow of the reduction in the size of the compressor.

On the other hand Zeuner has found ("Technische Thermodynamik," Leipzig, 1887 and 1890), in comparing results in a calculation of the loss of effect in various refrigerators, that under normal conditions this loss amounts to

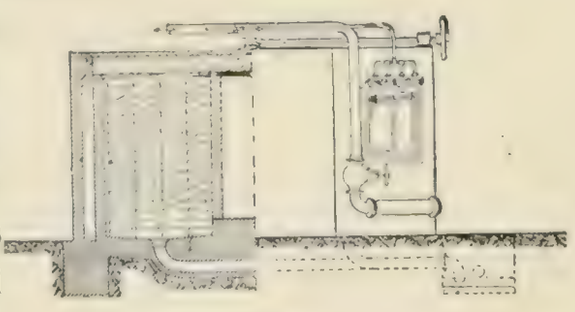


Fig. 83.

forty-eight per cent. when carbonic acid is used, and only eight per cent. with ammonia. The greatest drawback of the carbonic acid machines is the high pressure under which they work. This amounts to about sixty to seventy atmospheres, against 10·12 of ammonia, and 2·5 to 4 of sulphurous acid.

On the other hand, the supporters of the carbonic acid machines urge that others, especially those worked with ammonia, have an injurious effect on metal, and that the gases escaping accidentally are prejudicial to the health of the workmen within reach, and also on the meat being kept in the cold store.

"If the symptoms produced by the inhalation of a proportionately small quantity of ammonia," says Peltenkofer, "are compared with the experiments of Emmerich, where ten persons were exposed in a small room to an atmosphere containing eight per cent. carbonic acid, and not one of them was at all the worse, it is amusing to call to mind the remarks of some people that carbonic acid ice machines are more dangerous than ammonia ice machines. Facts prove that exactly the opposite is the case."

The disadvantages of carbonic acid machines can be avoided, according to Raydt, if compressors are constructed, in which the carbonic acid is liquefied at a pressure of from fifty to sixty atmospheres, which can be done without any danger resulting. On the contrary, the dangers are less than with other gases, as with the latter compressors of larger dimensions are required.

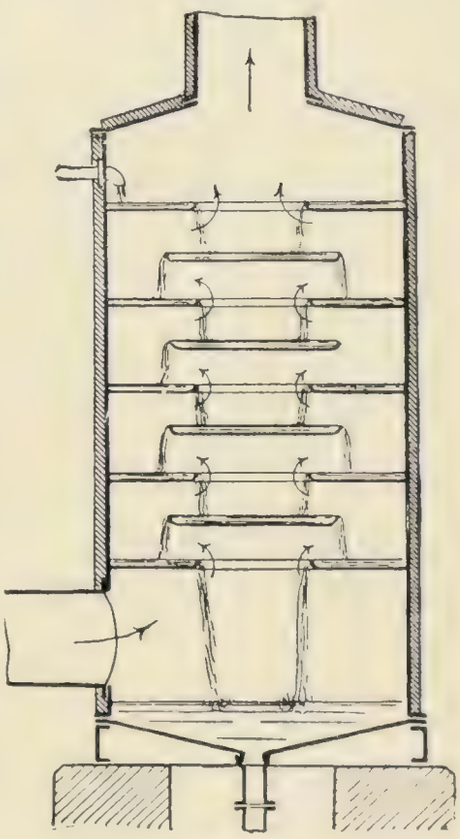


Fig. 89.

1. The superiority of the *carbonic acid compression machine of Raydt* is the fore-cooling apparatus.

This consists of two coils enclosed in a tank, one coil forming the connection between the condenser and the evaporator, and the other that between the evaporator and the compressor, while the tank itself is filled with brine.

The warm, liquefied carbonic acid formed in the condenser flows through the first coil on its way to the evaporator, before reaching

which it must pass through the fore-cooler, where it is cooled by the cold carbonic acid vapour returning from the evaporator, the brine allowing the heat interchange to take effect, so that on the one hand the temperature of the liquid carbonic acid is materially lowered, while on the other hand that coming from the evaporator on its way to the compressor is thoroughly dried.

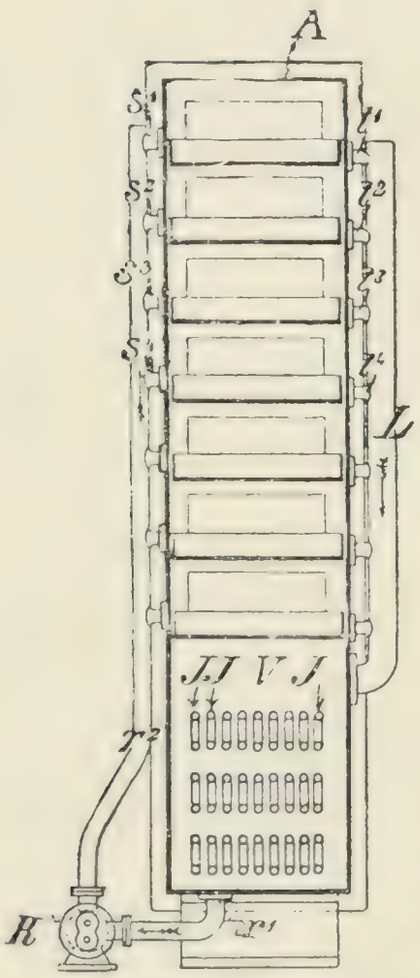


Fig. 90.

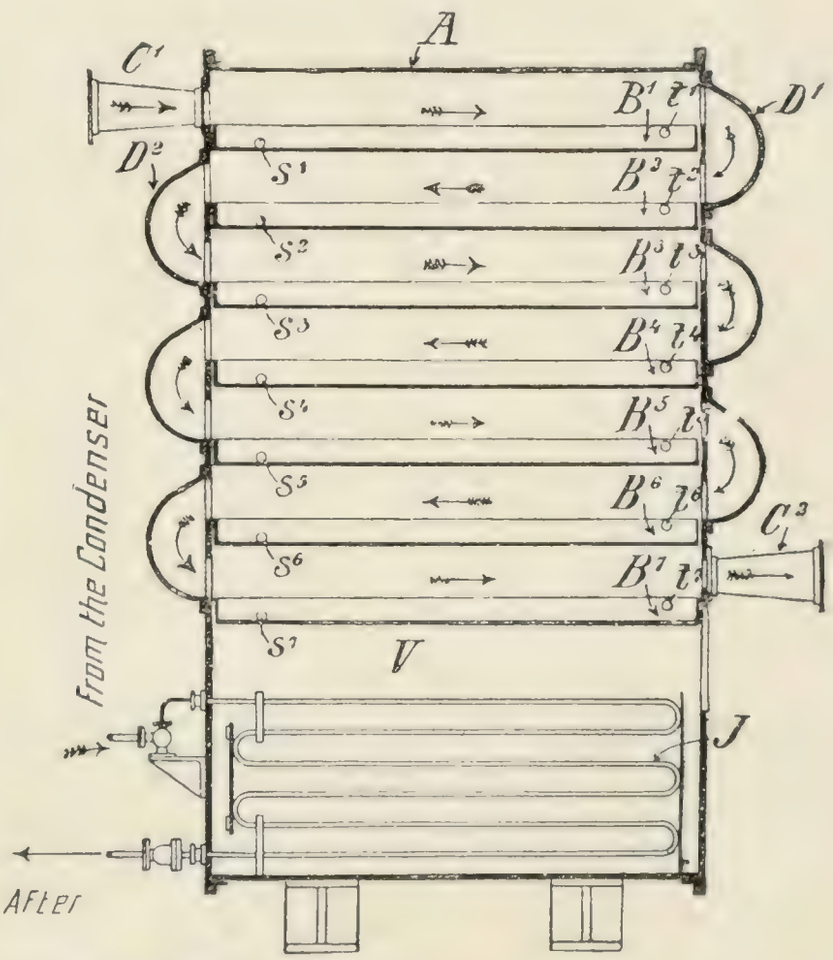


Fig. 91

Passing through the Compressors

To prevent waste, the gas collected in the chamber of the stuffing box of the compressor is conducted to a gasometer, out of which it is pumped into the system of pipes when required. The cooling of the air is effected by means of a special brine shower apparatus.

2. L. A. Riedinger, Augsburg (system Franz Windhausen).—The air is drawn out of the cold room by means of fans and over two separate coils through which brine flows. The air is cooled, and the moisture gathers on the pipes in the form of hoar-frost.

When one coil is frosted, it is thawed by reversing the current, so that the warm air from the cold room is passed over the frosted coil first, and then over the other, while at the same time warm brine circulates through the former coil, and perfectly cold brine through the second. By this means, and at regular intervals (every five or six hours), a continual thawing of the coils takes place, if the machine is in constant operation.

3. The Wepner System.—By this arrangement cooling can be effected in two ways, namely, by conducting the air over artificial ice, or over cold brine, as shown at fig. 90 (side view) and fig. 91 (front view). A is a box, consisting of a number of shallow tanks arranged one over the other (B1, B2, B3); the air to be cooled enters by an opening C1 in the side of the casing, flows over the surface of the first tank, and reaches the second by the passage D1, and so on until finally it goes out by C2, after having passed over all the tanks. These tanks can be filled with fresh water, and frozen by a machine to produce blocks of ice, over which the air can be conducted. Cooling by brine is effected in a like manner. The evaporator coils V for freezing can be in the lower part of the box, and the cold brine generated in it is raised by means of a pump R through a pipe *r2*, and delivered into the various tanks (B1, B2, B3) and returned by another pipe L to the evaporator. The air is conducted through the box in the same manner as when it is filled with artificial ice.

In addition to the above refrigerant *sulphurous acid* is also used. It was first introduced by Raoul Pictet, who also introduced what is known as the Pictet fluid, which consists of a mixture of sulphurous acid and carbonic acid.

According to experiments made at the testing station in Munich, it appears that the Pictet machines require twenty to sixty per cent. more power than the Linde ammonia compression machines to produce an equal supply of cold air.

The advantages claimed for the Pictet fluid, and also for sulphurous acid, are that they are not dangerous, while they work with $2\frac{1}{4}$-4 atm., as against 60-70 atm. for carbonic acid, and 10-12 atm for ammonia, and, further, that no special lubrication is required, the greasy nature of sulphurous acid being sufficient for the oiling of the compressor.

Reference must also be made to *ammonia absorption machines*, first built in Germany by Carré.

The ammonia liquor employed is heated by steam, and the ammonia gas is liberated with a temperature of 266°F., and a pressure of 10 atm. The gas passes into the condenser, and is liquefied ready for use in the evaporator, to cool the air passing through it.

The ammonia gas is then passed to the absorber, where it is absorbed by weak liquor from the generator, to which it returns to be again distilled from the water.

There are various heat economising vessels, which are only auxiliary to the actual process.

Loss of Weight by Air Cooling.—Before passing to the structural requirements of a cold room, it would be as well to consider the effect of cooling by artificial means.

As previously pointed out, moisture is extracted not only from the air in the cold room, but also from the articles cooled. The outer surface of the meat is thus dried, and the loss of water reduces the weight. Loss of weight also occurs when meat is hung in the open air.

Mr. Hengst, a slaughterhouse manager, after experimenting with beef, veal, mutton, and pork, reports as follows :

"After a week had elapsed the weight of the legs of beef had diminished in weight by 4 lbs. 6 oz., the legs of pork and veal 18 ozs., and the legs of mutton 4½ ozs. The legs of veal and pork began to show signs of decomposition at the end of a fortnight, and the legs of beef at the end of twenty-four days. No appearance of anything of the kind could be discovered on the legs of mutton even after being kept for a month. (According to Zschocke, beef takes forty hours to cool down from a temperature of 86° to 38° F.)

"The process of decomposition on the cross sections of the muscular tissues of the beef is caused by small rod-shaped microscopic organisms, which on account of the shortness of time could not be properly examined and experimented upon. The products of decomposition were almost odourless, and were only to be observed on the upper surface of the meat, while the layers of meat underneath had a thoroughly normal appearance, and had the smell of sound meat."

The author himself has made experiments in the cold store at Stolp with the following results :

A piece of beef weighing 116 ounces lost 29 ounces in twenty-two days, seventeen days later 12 ounces, twenty-eight days later 9 ounces, thus in all 50 ounces in sixty-seven days (= 43 per cent.) The meat was very juicy, and had a fresh, appetising odour. The dry layer on the top measured 3 mm. thick in seventeen days, and was reddish-black to black in colour, like smoked meat.

Horseflesh has a dry layer of 5 mm. at the end of forty-five days.

A second piece of beef of 200 ounces lost 51 ounces in fifteen days, and 11 ounces more in another twenty-five days ; thus 62 ounces in forty days (= 31 per cent.) This great loss of weight can only be accounted for by the circumstance that cut meat is more perishable than meat covered by its hide.

Boiled (tuberculous) beef was also tested, the results being that a piece of 87 ounces lost 12½ ounces in fourteen days and 40 ounces after twenty-eight days more. It was very much shrivelled up, but quite fresh in the middle, and had neither an unpleasant smell nor taste.

The director of the slaughterhouse at Göltz has made the following observations :

" After being kept eight days at a temperature of 40° F. the loss was :

¼	Bull	of	156 lbs.	in weight	lost	8 lbs.
½	Pig	,,	98 lbs.	,,	,,	3½ lbs.
1	Calf	,,	83 lbs.	,,	,,	8 lbs.
1	Sheep	,,	78 lbs.	,,	,,	3¼ lbs."

A quarter of beef weighing 191 lbs., after hanging for four days in a warm, dry temperature (77° to 88° F. in the shade through the day), lost 13 lbs. in weight. None of the meat was weighed at the commencement until it was dried and of the same temperature as the outer air. It is thus proved that meat suffers a much greater loss of weight when hung in the warm summer air than when it is hung in the cold room.

In the slaughterhouse at Antwerp, mutton has been kept for two years in a perfect condition.

The Manufacture of Ice.—Ice is manufactured in many slaughterhouses, partly for disposal to the butchers for the filling of their ice chests, partly to increase the profits of the slaughterhouse.

The superiority of artificial ice to natural ice has already been pointed out; reference will only now be made to the methods of manufacture.

Generally speaking, there is a large tank containing brine, and the necessary cooling coils, and a number of cans to contain the water to be frozen. An ice tank is usually combined with the evaporator of the cooling machine, and serves in such cases as the brine cooler. It is usually made of iron, thoroughly insulated, provided with a thick wood cover, and is separated into two compartments by an iron false bottom. The lower portion contains the evaporator coils, surrounded by brine, which is circulated through the upper compartment containing the moulds by a centrifugal pump at the end of a side wall. The ice cans are conical in shape, and are made of wrought iron. It has been found very advantageous in practice to make the blocks of ice as thin and flat as possible, so as to freeze them quickly. For instance, blocks weighing 56 lbs. and 6in. thick will take about thirty hours to freeze, while those of 28 lbs. and 3in. thick only require twelve to fifteen hours for their production. To avoid unnecessary loss by radiation, the frozen blocks are taken out only at the end of the generator, at which the cold solution rises into the upper compartment, and the fresh-filled cells are pushed in from the other end. In large factories these rows of cells are taken out by means of an overhead travelling crane, and those remaining behind are pushed forward by a screw, the mould frames being provided with rollers for the purpose. The row of cells thus raised is brought to a thawing-off tank filled with lukewarm water at the front end of the machine, and dipped into this for a few minutes. The blocks are thus loosened from the sides of the moulds, and the latter are then lowered into a slanting position by means of a tilting arrangement, so that the ice-blocks slide out, to be carried off to the ice-stores. The row of cells thus emptied is again drawn up by the travelling crane and carried to the other end of the ice tank, to be supplied with fresh water. It is then pushed into its place in the tank, and the freezing process begins again. In the same way each row of cells is dealt with when the ice is ready.

The filling apparatus, which is exactly the same breadth as the tank, has as many compartments in it as there are moulds in one row. Each compartment has its own outlet pipe

connected to a swing-frame, so that when this is let down the water contained in the apparatus flows into each of the moulds below.

If the apparatus is filled merely with common water, the ice thus generated will contain, as has been already described, all the impurities of the water it is made from, and will also be cloudy looking, due to the presence of a great number of air bubbles. Clear or crystal ice is preferable, as it is not only free from all muddiness, but by the use of distilled water is perfectly pure.

Agitation of the water during freezing also produces clear ice, and a large variety of apparatus has been employed for this purpose. The Linde Co. have a very simple arrangement, by which vertical rods dip into the cells, and are attached crosswise to a horizontally moved oscillating frame, with ball bearings. The lateral movement of the rods becomes less as the freezing proceeds, and eventually they must be withdrawn, leaving a small unfrozen core, representing about ten to twelve per cent. of the block, which may be allowed to freeze after the oscillating rods are removed, or can be drawn off and replaced by distilled water.

The distilled water necessary for the manufacture of pure ice is usually obtained from the condensed steam from the engine by the use of a surface condenser.

The condensed water should be cleansed from oil, etc., by sand or charcoal filters. A variety of special apparatus is to be had for making distilled water if the condensed steam from the engine is not available.

The moulds are not filled by means of a filling-apparatus in this case, but each mould must be filled separately, by means of a hose, which takes the water to the bottom of the mould, so that the water does not absorb more air as it rushes in, and so make the ice cloudy. The exhaust steam may be condensed, freed from oil and re-boiled, and then allowed to cool, after which it is filtered and is used to fill the moulds.

The price of ice varies considerably, but butchers can usually buy at a lower rate than other consumers. One cwt. can be bought for 6d. in Oberhausen, St. Johann (discount, if taken regularly), Dortmund (for butchers, it costs others double), Cologne, and Riesa ; for 6¾d. in Barmen, Cassel, Dresden, Elberfield, Leipzig, and Wesel ; 9½d. in Danzig, Essen, and Görlitz ; 1s. in Breslau ; 12 lbs. for 2d. in Gotha and Stolp ; 36 lbs. for 2d. in Brandenburg, and for 3½d. in Kreuznach.

The Situation of the Cold Store.—The conditions governing the situation of all buildings connected with articles of diet must be observed in the laying out and structural arrangement of a cold store; it must be convenient of access by carts, etc., have a smooth and easily cleaned floor surface, and be capable of thorough ventilation.

The front of the cold store is usually built to face the north, and should be so arranged that meat transported from the slaughter-house towards it is always under cover. When there is a direct connection between slaughter-hall and cold store, which is not possible in small slaughterhouses (such as those shown in figs. 2, 51, and 52), this should be effected either by a large general connecting passage (see figs. 10, 54, and 57)—and this is specially recommended—or there should at least be a protecting roof of sheet iron all along the way the waggons travel from the halls to the cold store (see figs. 56 and 59).

Objections have been raised against the direct connection of cold stores and slaughter-halls, especially if cattle stalls are in direct connection with the latter. Mr. Schultze, a borough architect, says: "In the laying out of cold stores it is important to see that the air which finds its way into the building when doors, etc., are opened, is good and pure. This requirement will not be fulfilled if the cold store has a door directly connecting with the slaughter-hall, and the latter is similarly connected with the cattle stalls; in this case the odours from the slaughterhouse and the stalls will pass into the cold store directly the doors open, and therefore a too strict regard for the business requirements must be waived in favour of hygienic demands."

We would further remark, while on this subject, as has already been mentioned when discussing the situation of the cattle stalls to slaughterhouse in Chapter VI., that the bad smell can be prevented from penetrating into the slaughterhouse if great cleanliness is observed and the doors are made to shut closely. It is a sign that the place is carelessly managed if there is any smell in the slaughterhouse that could penetrate into the cold store. If, for instance, there is a really bad smell observable when the intestines are being taken out it is not necessary that the cold store door should be standing open at that moment; it is usually not opened until slaughtering is finished for the day.

Finally, there can be a special room between the cold store and the slaughterhouse, called *the cooling room*, which, besides connecting both rooms, offers various advantages, and is never wanting in any new establishment.

But cold store and slaughterhouse are not situated beside each other so much out of regard to convenience as because it is advisable to convey the meat into the cold store untouched by the weather. Thus, the *connecting passages* already discussed on page 75 are of great importance, which make the close connection between slaughterhouse and cold store unnecessary, and yet offer favourable conditions for such a purpose.

If it be desirable to economise space, the cold rooms may be situated *below* the slaughter-halls, as in Dresden, Frankfurt a/M., Görlitz, Neisse, and other towns.

Size and Arrangement of the Cold Store.—The size of the cold store can be calculated on the following scale:

Assuming that 1,800 oxen, 5,400 small beasts, and 2,700 pigs are killed annually, this will work out thus—for each of the

two slaughtering days *in a week* $\frac{1{,}800}{2{\cdot}50} = 18$ oxen

,, ,, ,, ,, $\frac{5{,}400}{2{\cdot}50} = 54$ small beasts

,, ,, ,, ,, $\frac{2{,}700}{2.50} = 27$ pigs

will be killed. If we reckon that each kind of animal weighs a certain amount, according to the table on page 33, then, on an average, large cattle will weigh 578 lbs. (bulls 660 lbs., cows 495 lbs.); small animals 61 lbs. (calves 79 lbs., sheep 43 lbs.); pigs 176 lbs. Then we have a weekly slaughter of 18,250 pounds ($18 \times 578 = 10{,}304 + 54 \times 61 = 3{,}294 + 27 \times 176 = 4{,}652$; total, 18,250 lbs.) This quantity, therefore, must be brought into the cold store. Then, perhaps, a quarter of this amount, say 4,500 lbs., may be left over from the last killing day. That will make 22,750 lbs. in all. Now, as 320 lbs. of meat can be stored on ten square feet cold store floor area, then for the 22,750 lbs. 710 square feet are needed $\left(\frac{22{,}750}{320} = 71\right)$. Then 4ft. 6in.

must be reckoned for the width of a passage, so that about 160 to 220 square feet must be added to this (or a third of the surface), so that such a cold store ought to have an area of about 1,000 square feet.

In measuring the size, regard must be paid to the fact that the town may increase, and more consumers will entail an enlarged slaughterhouse; it is advisable, therefore, that the cold store itself be built low, and the whole building so arranged that an upper or under storey can be added. For this purpose the lower storey should be half sunk, so that only a short staircase will be required to reach it.

There is usually a cooling-room before the cold-room proper, which is just as necessary to the latter building as is a cold-room for the slaughterhouse. (In Görlitz the cooling-room lies level with the ground, but a part of the cold-room proper lies *underneath it*.) The cooling-room was originally intended only as a vestibule, in order to avoid a direct communication between the air from outside and that of the cold-store. But of late its usefulness has been increased, and large pieces of meat (sides of beef and particularly heavy pigs) are placed in this room to cool down naturally.

By fitting it with tables, clearing blocks, etc., this room can be used at the same time as a cutting-up room, and thus save encumbering the chambers with pieces of fat, meat, and bones, which stick fast and soon go bad. In large cold stores there are special *cutting-up rooms*, which are very useful, especially if a part is fitted up as a pickling-room, so that the store itself is freed from pickle-casks, and the moisture arising from the brine is kept away from the cold-room proper, while the temperature in the pickling-room can be kept at the degree necessary for pickling (47° to 50° F., instead of 36° to 40°). These rooms must be carefully fitted up, the walls being of some kind of tiles, and the floor of flags. Paint must *not* be used in the pickling-room, as it would be too much affected by the brine splashed about. These rooms can be built on the ground-level, as in Barmen, 4,320 square feet; Reydt, 810 square feet, with thirty-five pickling-tanks; Mannheim, 3,130 square feet; Posen, 2,700 square feet; or underground, as in Cologne, 4,750 square feet, with fifty-six cellars, each of 45 square feet, containing 298 pickling-tanks; Mayence, Heidelberg, 375 square feet, with forty cellars; Berlin, fourteen pickling-rooms; Düsseldorf, 2,000 square

feet. In these cold stores the cutting-up room is also in the basement, except in Mayence, where it is half on the ground-floor and half in the basement. In smaller slaughterhouses, like Heidelberg and Mayence, part of the pickle-room is fitted up as a cutting-up room. It is generally advisable that both rooms should be *near each other on the ground floor*, and to avoid an upper storey if possible.

The pickle-tubs may either be of pine, oak, or pitch pine. But as these are all difficult to clean and soon leak, some prefer cement tanks, which, on the other hand, offer the disadvantage of being easily affected by the brine, become sour, and, on account of their rough surface, are also difficult to keep clean. The favourite shape is a long trough with a compartment of 20 to 40 cubic feet capacity. The least objectionable, but also the dearest, are the glazed earthenware tanks similar to the tripe-washing vessels. They are thoroughly sour-proof, and the ware is usually so closely pressed that even when the glazing is accidentally damaged the brine does not penetrate into it. For a protection these are enclosed in wooden boxes, and the interstices are filled with sawdust, etc., as an insulation. Slabs of slate are often used instead of clay.

Over these vessels there are taps for hot and cold water, and the discharge cocks deliver into gutters in the floor.

The tubs are usually placed conveniently around the room and provided with wooden lids. But it is better, particularly in large slaughterhouses, to divide them so as to let them out according to their size (Cologne 30s., Reydt 6s., Mayence 25s.—30s., Barmen 40s. 10 square feet per annum). In the basement of the cold store at Magdeburg there is a special "freezing chamber for salt water fish." In the top storey of the cold storage extension building in the slaughterhouse at Berlin *drying* and *smoking* rooms have been laid out. In the former the pieces of meat to be smoked are first dried, this being accomplished by means of special ventilation. Near these drying-rooms there are smoking-rooms, four of which discharge their smoke into a common chimney. The whole building is fitted with electric light.

The height of the cold room should not be greater than 10ft. to 15ft. In some slaughterhouses it is considerably higher, especially where there are overhead track bars—for instance, in Görlitz the height is 21ft. The cold store should not be less than 10ft.

In many slaughterhouses space is economised by fitting this room with two rows of hooks, *one over the other*, the lower for quarters of beef and for pork being 6ft. above the floor and the upper row for sheep, calves, etc., being about 4ft. to 4ft. 3in. above the lower row. 13ft. is quite sufficient for this arrangement, about 2ft. 6in. being enough for the air ducts, etc.

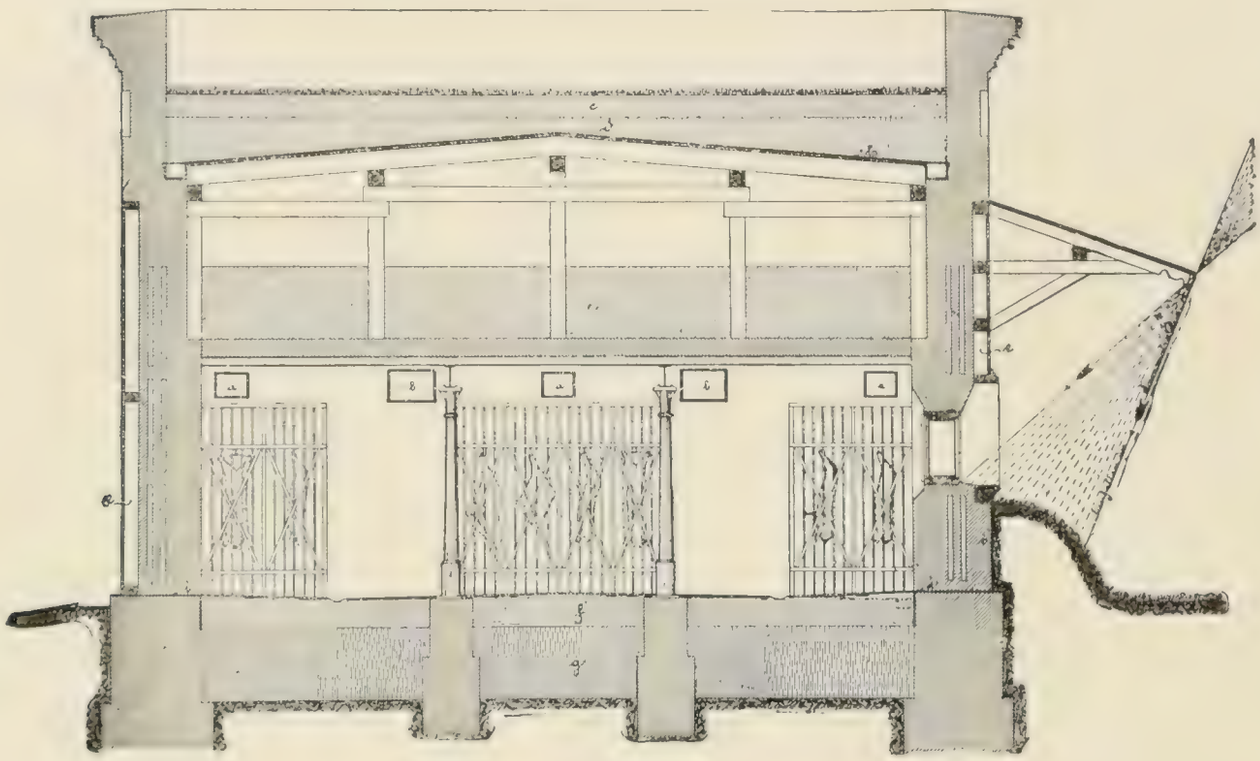


Fig. 92.

a. Ventilator for cold air. *c*. Mould. *e*. Peat moss.
b. ,, ,, warm air. *d*. Gravel. *f*. Concrete.
g. Coke breeze. *h*. Cement.

It is of great importance that both floor and walls should be thoroughly dry, as by the penetration of moisture not only is the loss of cold very great, but the enclosed air soon becomes musty. The floor and the walls should thus be insulated. This can be done by first forming a layer of concrete 6in. to 10in. thick, and over this a layer of coke, wood ashes, or peat-mould about 18in. thick or more. The third layer should form the actual floor, and be either of flags or cemented. Fig. 92 is a transverse section of a cold store thus built.

Of course there must be a good fall to the gutters, which must discharge over gullies with good stench traps. The surrounding walls should be as strong as possible (3ft. thick), and should also have air spaces and be insulated.

These insulating spaces are filled either with the materials already mentioned or kieselguhr, pulverised chalk, pumicestone, cork refuse, charcoal, and silicate cotton (slag wool). Such easily decomposed materials as sawdust and wood shavings must be avoided. Cork slabs jointed and bedded in plaster also make a very suitable covering for the inner walls ; so does pumice, which is antiseptic, waterproof, and heat-retaining. A third covering is of infusorial cork slabs. These are prepared in slabs 3ft. 3in. × 1ft. 6in., require fewer joints, and are fire-proof. The outer surface should be covered over with laths, and then coated with a plaster of cement $\frac{3}{4}$in. thick, carefully smoothed over. The inner walls may be very suitably covered with P. & B. or Willesden paper, which, besides preserving the insulating materials, is non-conducting.

No tarred or strong-smelling material must be employed for cold store purposes, as proved by the disastrous results in the slaughter-houses at Coburg, Cologne, Riesa, Zschopau, etc.

On these grounds tar paving as floors is not suitable for cold stores.

Doors and *windows* must be very close-fitting. The frames should be hung so that when they are opened there is no cross-current of air. This can be done if the entrances to the actual cold room are placed on one side of the cooling room.

Instead of common doors, these inner cold rooms should be fitted with double doors, the inner ones being hung so as to be self-closing. The windows should be as few as possible. They should never face the sunny sides (south or west), and to prevent the penetration of direct sunbeams they should be thickly glazed with dim or thick green rough glass (containing about two per cent. protoxide of iron).

Skylights should be so arranged as to act as ventilators, so that in cold weather there is a sufficient supply of fresh air.

Hollow glass bricks (Silesian) have been used instead of windows in the slaughterhouses of Cologne and Breslau. According to experiments made in Cologne, there should be two thicknesses, with an air space between. These serve the purpose of insulation better than triple windows of rough glass, and as windows are easily cracked when the sun shines full on them, it is well to protect them with an overhanging roof.

The roofs, which are either brick or concrete arches, are insulated

by layers of peat-mould or coke from about 18in. to 36in. thick, covered by a layer of clay.

Inner Fittings.—The floors and walls must be covered with a light-coloured material, and easily cleaned, as previously mentioned.

Cement-rendering, *without* any paint whatever, will not do, for it has been proved that schizomycetes settle on such walls and create a strong mouldy smell, which spreads through the entire cold-room. If it is not considered advisable to paint the walls, they must undergo a thorough cleaning and disinfection several times in the year. For the latter an antimonium-paste is strongly recommended. In several slaughterhouses the walls of the cold-room are lined with zinc.

The best mode of lighting is by electricity, because it gives out neither heat nor smell—two important characteristics. According to Lorenz there is developed in one hour:

With one man working, about 130 units of heat.

One argand-burner, with $3\frac{1}{2}$ cubic feet gas consumption, about 900 units of heat.

One glow lamp, of sixteen candle-power, about thirty to forty units of heat.

One composite candle, about 110 units of heat.

The cold-room proper is divided into separate lock-up compartments of various sizes. The smallest of these should not be less than thirty-two square feet floor area, and the largest in small or medium-sized slaughterhouses should not cover more than sixty-five to seventy-five square feet (in Breslau there are some 162 square feet). The most useful size is about fifty square feet. Besides these lock-up compartments, there should be large open spaces, either for common use or to be let out daily, according to the number of hooks used.

The compartment can have separating walls of various materials, such as:

(*a*) Iron rails; these are only occasionally met with, and are not to be recommended, as they make purloining too easy.

(*b*) Galvanised wire netting; very much used, but not advisable, as fat, etc., lodges between the wires, and tends to uncleanliness.

(*c*) Corrugated iron, with wire-netting; the lower part of the wall of wire-netting to about one foot high; the middle part (about 4ft. 6in.) of corrugated iron; and the top part (about 2ft. 3in.) of wire-netting again.

(*d*) Perforated corrugated iron sheets.

(*e*) Wirework, with wired hard-glass in the same order as the wirework, and corrugated sheet iron.

The last is the favourite combination, and is most to be recommended. The glass part is the portion that comes in contact with the meat, and its smooth surface is easily cleaned. On the other

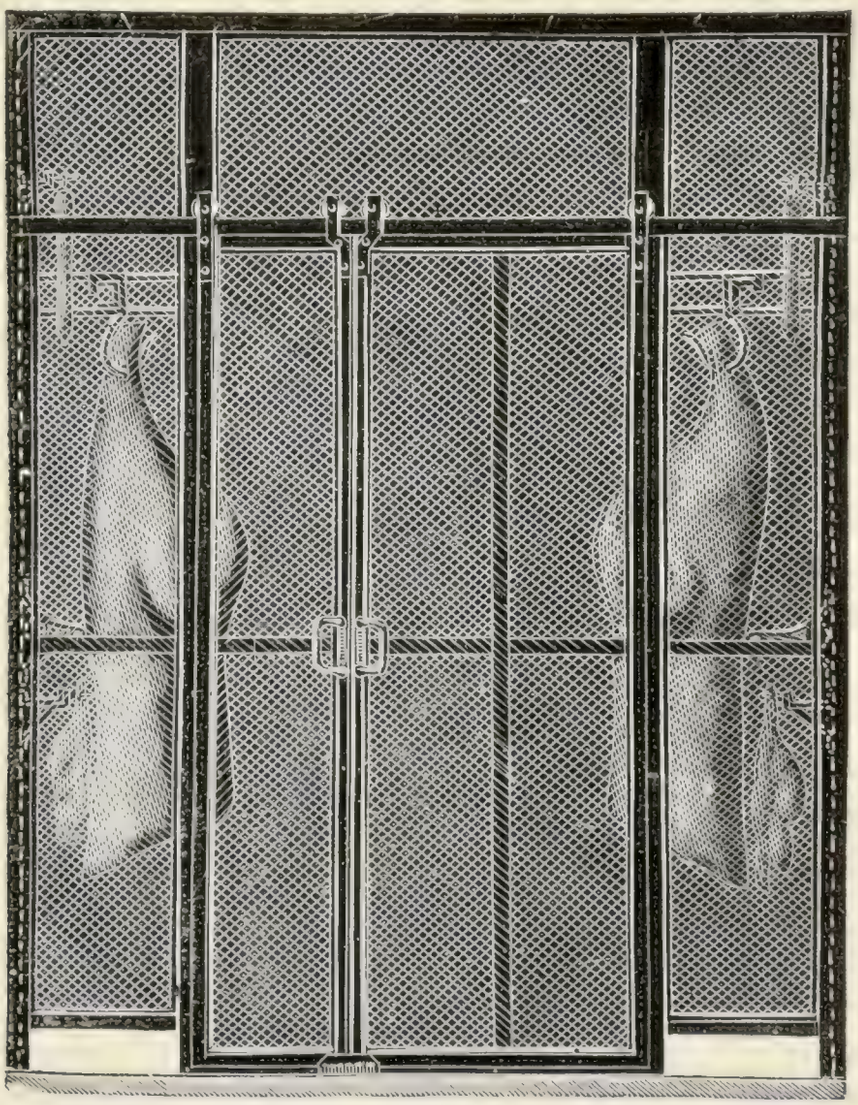


Fig. 93.

hand, no one can reach his hand through from one compartment into the other. Every compartment should be provided with a raised curb at the floor to prevent any dirt getting in from the neighbouring compartments. The latter should have sliding doors,

preferably in two parts (see fig. 93, page 189). These economise space, and are indispensable where the passages are narrow. Each compartment, and also the large room, should have hook frames fitted up in two rows; occasionally movable hooks are provided. The lower hooks should be fitted up about 6ft. above the floor. If they are lower than this it is more difficult to take the weight off the hooks. Behind these large hooks it is well to have a row of smaller hooks. These should be movable, and similar to those in the pig slaughter-hall. To obtain more space, movable brackets can be fixed under the hook frames, between which iron rods can be placed the full breadth of the store, and from which hang movable treble hooks.

The most convenient method of conveying meat from the slaughterhouse to the cold store is by means of the track bar arrangement described already in pages 90-97). Another method is to have hooked frames which are fixed on to small waggons running along narrow gauge tracks to the cold store.

In large institutions it is usual to have a railway siding directly to the cold store, so that when necessary the meat can be loaded and unloaded there in large quantities.

Income and Cost of Working.

In Stettin the annual income from the cold store alone is about £350, while the upkeep, management, amortisation, and interest are about £1,850. In Stolp about £200 of the annual income is set aside for the requirements of the cold store. In Bremen it costs 7s. 6d. per hour to keep the meat cool—that means that five pounds weight of meat costs a penny a day. As is seen by these calculations, the income derived from the cold chamber does not cover the expenditure, which must be augmented by other means, for as the occupation of these cells is voluntary, they will remain empty if a high price is charged; while, on the other hand, compulsion must not be exercised. The returns can be increased, however, if ice-making is carried on at the same time.

Dr. Linde has made the following calculations for a cold store covering 6,480 square feet ground area after having been worked for six months. This is intended for a town with a population of 60,000.

A. Cost of Outlay.

1.	Building (exclusive of site), meat compartments, engine and boiler house, shaft, setting for boiler, foundation, etc.	£4,200
2.	Machinery, including steam boiler, steam engine, refrigerator, air cooling apparatus, pumps, belts, pipes, etc.	3,200
	Total capital outlay	£7,400

B. Cost of Working.

1.	Staff. One engineer for twelve months, two firemen for six months			£153
2.	Coal, oil waste, etc., for 180 working days each of twenty-four hours			300
3.	Sinking fund and general upkeep :			
	8 per cent. on	£3,200	£256	
	2 per cent. on	4,200	84	340
4.	Interest, $3\frac{1}{2}$ per cent. average value on the books ...			130
				£923

For a cold store of this kind, with 6,480 square feet ground area, which means about 4,600 square feet of floor area for compartments, and a space of 1,880 square feet for passages, the annual rental for 10 square feet of space should be, roughly, about £2 4s. to make it pay.

Even in small undertakings the cost of working the cold store is considerable, as the following calculation will show. These are for a cold store covering 2,160 square feet ground area, and suitable for a town with a population of about 25,000.

A. Cost of Outlay.

1.	Buildings (exclusive of site, as above)	£1,600
2.	Machinery fittings as before	1,400
	Entire outlay capital	£3,000

B. Cost of Management.

1.	Staff. One engineer for six months		£36
2.	Coal, etc., as above		140
3.	Sinking fund and general upkeep :		
	8 per cent. on £1,400	£112	
	2 per cent. on 1,600	32	144
4.	Interest, 3½ per cent. on average value in books ...		52 10
			£372 10

The above cold store, of which the annual cost is about £372 10s., would give about 1,620 square feet of floor area for meat chambers, and about 540 square feet for passages, etc. There can, therefore, be eighteen chambers covering about 42 square feet of ground, and twenty-six compartments covering 33 square feet. For each 105 square feet of effectively used floor area, the yearly expense will amount to about 50s.

The following calculation of expenses was made by the Linde Company, at the request of Dr. Schwarz, for the benefit of the great number of small towns with about 10,000 inhabitants, and which possess a slaughterhouse but no cold store.

A. Cost of Outlay.

1. Buildings.

(*a*)	Cold store covering 1,400 square feet open space and about 1,850 square feet built upon (exclusive of cost of site) for about 7s. 6d. per foot occupied by buildings	£700
(*b*)	Meat chamber arrangements for 1,025 square feet of useful space at 4s. 2d. per foot	214
(*c*)	Engine and boiler-house covering about 1,200 square feet at 6s. 4½d. per foot	385
(*d*)	Engine and boiler, foundation and setting, shaft, etc.	151
		£1,450

2. Machinery.

(*a*)	Boiler (270 square feet of heating surface and for 7 atm.), including pumps, etc.	£175
(*b*)	Steam engine (non-condensing)	206
(*c*)	Refrigerating machine (equal to 2½ cwt. of ice per hour)	400
(*d*)	Cooling apparatus, fan, carriage	285
(*e*)	Steam, water and air pipes, fixing and charging the apparatus, etc.	234
		£1,300

B. Cost of Upkeep.

(*a*)	Staff (six months) one engineer, one fireman		£72
(*b*)	90 tons of coal at £1 per ton ...	£90	
	Oil, packing, ammonia, etc. ...	25	115
(*c*)	Sinking fund and general upkeep:		
	8 per cent. on £1,300	104	
	2 per cent. on 1,450	29	133
(*d*)	Interest, 3½ per cent. on the average value in books		48 10
			£368 10

This expenditure is to be balanced by the annual income derived from the renting of the 1,025 square feet of ground area covered by chamber and supplying the slaughterhouse with hot water. When it is taken into consideration that where there is no cold store a hot-water boiler must be fitted up, and that at least thirty per cent. of the coal used is for the heating of the water, it will be recognised that the cost of coal, etc., debited to the cold store can be reduced about £22 10s., the cost for the outlay on machinery about £100, that for buildings on account of the boiler-house and chimney otherwise necessary, about £250, which brings the entire cost of outlay, roughly, to about £2,400, and the *entire cost of the cold store working expenses* to

(*a*)	Staff			£72 0
(*b*)	Coals ... £63 ; oil, etc...	£26 10		89 10
(*c*)	Sinking fund and general upkeep:			
	8 per cent. on £1,200	96		
	2 per cent. on 1,200	24		120
(*d*)	Interest, 3½ per cent. of average value on books			42
	In all			£323 10 0

The annual cost for 10 square feet of floor space used is, roughly speaking, about £2 5s., according to the above calculations.

It should be borne in mind that the cost of working the cold stores depends upon the length of time it is kept running. This period usually extends to about 180 working days of *twelve* hours each in small institutions of this kind.

For such an establishment *one* engineer is sufficient, who can also be his own fireman. His salary will not have to be paid out of the receipts from the cold stores, because his services are absolutely necessary without it, for the other machinery of the slaughterhouse, as well as the water-heating apparatus, etc. The cold store requires a fifteen horse-power steam-engine, which works non-condensing, to allow for the further use of the steam for water heating, and consumes 35 lbs. steam per horse-power per hour—470 lbs. of steam in all (including 45 lbs. lost by condensation). If coals are burned, from every pound of which seven pounds of steam can be obtained, then the consumption of coal daily for a working day of twelve hours is, roughly speaking, about 10 cwts.

Cold stores are much more profitable concerns if ice is produced at the same time, and on which large incomes may be attained. According to statements made by the *Maschinenbau-Anstalt-Humboldt*, of Kalk, the following are the expenses for a cold store for a town of 55,000 inhabitants:

A. Cost of Outlay.

1.	Two-storeyed cold stores, having 5,670 square feet ground area, two cooling rooms of 1,350 square feet, two cold rooms of 4,320 square feet floor area, and 2,800 square feet when divided into chamber, boiler-house, and engine-house, shaft, well, machinery foundations, etc.	£4,000
2.	Machinery and fittings (two boilers, steam-engine, refrigerating machine, with all the parts and pipes, ice plant for producing ten tons of ice per day)	5,000

B. Cost of Working for 150 Working Days of 24 Hours.

1.	Sinking fund, interest, and general upkeep of the premises, five per cent. on £4,000	£200
2.	Sinking fund, interest, and general upkeep of the machinery, ten per cent. on £4,000	400

3.	Staff (one engineer, two firemen, two labourers) ...	£165
4.	Coal, oil, etc.	185
	Total working expenses	£950

Against this expenditure there is the returns on the sale of 1,500 tons of ice. If sold at 8s. per ton, there will be an income of £600. That still leaves £350 to be covered, which can be obtained from the rentals of the cold chambers. To this can finally be added the letting of the pre-cooling room, 2,800 square feet of which, as reckoned above as available, at 2s. 6d. per foot, will bring in the requisite sum of £350. The rents charged for the chambers in the cold store vary very much in different parts of Germany.

The following list of seventy-eight towns in different parts of the empire shows a variation from 1s. to 5s. 6d. per foot, or an average of 2s. 10d. (The prices are per square foot of floor area) :

5s. 6d. in Hamburg.
5s. in Wesel.
4s. 6d. in Bochum and Cologne.
4s. 3d. in Breslau, Landsberg a/W. (6d. per piece per day).
3s. 10d. in Barmen, Freiburg i/B., Halle, Hildesheim, San Johann.
3s. 6d. in Wurtzburg, Dresden (for seven months only).
3s. 3d. in Brandenburg, Kreuznach, Crefeld (to be lowered to 1s. 9d.), Cassel, Erlangen, Passau, Schneidemühl, Halberstadt.
3s. in Weimar, Dortmund, Frankfort a/M., Harburg, Lennep.
2s. 10d. in Beuthen, Brunswick, Cleves, Coblence, Gera, Gorlitz, Heilbron, Königsberg, Quedlinburg, Strasburg i/E., Werden, Wiesbaden.
2s. 4d. in Oberhausen, Torgau.
2s. 3d. in Aix-la-Chapelle, Chemnitz, Detmold, Elbing, Hof, Leipzig, Meran, Minden, Nordhausen, Nuremberg, Riesa, Stettin, Weissenfels, Zwickau.
1s. 9d. in Bernburg, Celle, Cottbus, Eisenach, Grossenhain, Liegnitz, Naumburg, Stolp, Viersen.
1s. 7d. in Gotha, Zittau.
1s. 6d. in Lauenburg i/P.
1s. 5d. in Hanover, Pforzheim.
1s. 4d. in Apolda, Kitzingen, Remscheid.

1s. 3d. in Stralsund.

1s. 1d. in Neisse, Rostock.

1s. in Göttingen, Tilsit.

In other states a fixed charge is made for the whole chamber. Thus in Frankfort a/O., each chamber on the basement is let at £4 10s., on the ground floor £5 12s.; Munich-Gladbach, £5; Myslowitz, £9 (for pigs 1s. per night, side of beef 9d., calves and sheep 5d.); Saarbruck, £12 10s. for a large chamber, £5 for a small one; Spandau, £3, £4 10s., and £6; Doppelzelle, £7 10s.; Weissenfels, £5.

In a number of towns only a small direct charge is made for the use of the chambers, and the deficit is made up by the slaughterhouse dues; for instance, in Gube the charge is 10s. a year for a chamber (£2 10s. to those who are not butchers).

In other towns again the cold store is *free* and at the disposal of everyone, while all the other dues are correspondingly increased, it being held that the cold store is a *necessary* and *important part* of the slaughterhouse for the purpose of keeping the meat of healthy animals sound until ready for consumption. That opinion was expressed in the Conference of Slaughterhouse Managers at Berlin in 1893, but it met with no support, because it was in opposition to an arrangement required by law, and especially injured those who either possessed a cold store of their own or would not use the public store, especially if they had to pay the dues whether they used the place or not. In Osnabruck the butchers' guild there have leased out the entire cold store for £200 a year—an arrangement not to be recommended.

At the nineteenth annual meeting of the Mannheim Butchers' Association opinions were expressed against this proceeding, and objections were made to the costs of the upkeep of the cold store being reckoned along with the slaughterhouse dues. A cold store ought to be treated as an industrial municipal undertaking like gas-works, waterworks, etc. Acting on this assumption a master butcher of Cologne appeared before the District Committee with a complaint against such a due being exacted. The latter then delivered the following judgment (12th Oct., 1897): "At the present day a town like Cologne *would not be allowed* to erect a slaughter-house *without having a cold store*. Where slaughterhouses still exist without cold stores, they are either *old* undertakings or belong

to *small* towns. The refrigerating arrangements are, therefore, to be regarded as a *necessary and inseparable component part of a slaughterhouse,* and the costs of the cold store can be added to the slaughter dues."

If the butchers in the end won the victory, their trade would be the only losers, as the town would not be likely to build cold stores at their own risk without having a clear understanding that such an undertaking would repay them. Again, it is not at all unlikely that many of those already existing would be ruined and closed for want of custom.

Most slaughterhouses have *no* separate balance-sheet for their cold store—in fact, Duisberg, Witten, and Wesel appear to be the only places where distinct accounts are kept, for the following reasons :

1. Par. 1 of the Laws of 1868-81 gives a clear indication that a cold store is not considered an integral part of a slaughterhouse. Par. 2 of 14th July, 1893, indicates nothing in favour of the opposite opinion.

2. If a cold store were, according to the laws of 1868 and 1881, an integral part of a slaughterhouse, then the butchers would be *legally compelled* to use the *cold store* built on the premises of the municipal slaughterhouse, just as they can be compelled to use the common slaughterhouse.

3. Separate balance-sheets give a clear indication of the productiveness of the cold store.

The cold store is only allowed to be used by the horse-butchers in very few towns.

The towns with dog-killing establishments (Chemnitz and Zittau) do not allow these animals to be brought into the cold store.

There is, however, no valid reason why the horse-slaughterer should be debarred from the advantages of such a building.

The cold store compartments have not been restricted to butchers ; they can also be rented to dealers in game, butter, etc.

1. *Regulations for the Use of Cold Stores.*—The rules for the management of a cold store can either be drawn up in an independent form or in the form of a lease to each lessee. The latter form is preferable, and can be arranged from the following rules. 1, 2,

13, and 14 are omitted, as these four paragraphs refer to letting contracts only.

AGREEMENT AS TO LETTING.

Memorandum of agreement between the Corporation of the town of ... . as lessor, and .... as tenant.

I, ..., rent ..... cooling chamber, No. ....., with ..... movable meat hooks, and ..... square feet of space in the municipal slaughterhouse at ...., from .... until ....., for a yearly sum of £..... ..... (to be spelled as well as written in figures) £....., under the following conditions.

2. The rent is to be paid half-yearly in advance, and always within the first eight days of the half-year, commencing April the 1st, and October the 1st; failure to make payment gives the lessor an immediate right to rescind the contract and take possession of the chamber.

The tenant must give some security for the fulfilment of this liability.

3. The cold store will only be in use during the hot seasons of the year, the period depending entirely on the weather.

The officials of the slaughterhouse will endeavour to keep the temperature of the cold store uniformly between 36° and 40° F., but they do not guarantee this, and the tenant is not entitled to claim any compensation in respect of any variation beyond these temperatures.

4. The compartment rented may always[1] be used as a place of storage, but it can[2] only be entered at the following hours:

[1] In some cold stores regulations the compartments are only allowed to be used during the refrigerating season. This regulation is decidedly a real hardship, for there is no reason why the empty rooms should not be used during the other seasons of the year.

[2] It is of the utmost importance that the chambers should only be entered at stated hours, and not during the whole day; for, on the one hand, better control is possible, and, secondly, the loss is materially reduced. There are few towns in which the cold store is open all day long, but we may mention Bremen, Frankfort-a/M., Hildesheim, Leipzig, and Wiesbaden. In Oberhausen the only restriction is that the cold store will be opened three hours daily, and when the outside temperature rises above 72° F. There is almost unlimited access to the cold stores at Clive, Cottbus, Dortmund, Duisburg, Heilbronn, etc. It can hardly be contended that the store must be kept open all day in the interests of the butchers themselves, because in almost all guild slaughterhouses, where the butchers can do as they please, admission to the cold store is limited to a very few hours. At the previously mentioned conference it was almost unanimously agreed that the cold store should only be entered at stated hours. Exceptions should be made in cases of necessity, if a special small opening fee is paid of 2d. or 3d., as is the case in guild cold stores.

In larger slaughterhouses the opening and shutting of the cold store is notified by the ringing of a bell through the various workrooms. But a steam whistle answers the same purpose, and is usually in existence to notify the closing of the slaughterhouse.

1. During the refrigerating period.

(*a*) On working days.

In the morning during the first hour after the slaughterhouse is opened. Mid-day and in the evening during the last hour before the slaughterhouse is closed. On market days between 3 and 4 in the afternoon.

(*b*) On Sundays and holidays.[3]

In the months of May between 6 and 7 a.m., in the other months of the cool period from 7 to 8 a.m., and in the forenoons from 11 to 11.30.

2. During *the rest* of the year it may be entered at any time in working hours.

Outside these hours the cold store can only be entered by permission of the manager of the slaughterhouse. The slaughterhouse manager may at any time make a change in the hours mentioned.

5. After entering or leaving the cold store the doors must be carefully closed at once. The passages intended for traffic must not be filled up with any articles whatever, nor must they be used for any sort of work. Hand-barrows are not allowed in the cold store.

The tenant is permitted to fix his nameplate upon the chamber he rents, provided that he has it made according to a prescribed pattern.

6. The tenant must not bring meat[4] into the cold store until it is thoroughly dry, and cooled down to the temperature of the air. Should there be a dispute as to when this is accomplished, the case will be decided by the slaughterhouse manager or his representative.[5]

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[3] In the laws concerning Sunday labour in works and factories there is an exception made (III.) in connection with the supplying of the daily needs, and special requirements for Sundays and holidays.

"If the Sunday labour lasts *longer* than three hours, then the workmen must be allowed the entire holiday of fully thirty-six hours, either every third Sunday or every second Sunday from 6 a.m. till 6 p.m. or every week for the second half of a working day, that is, from one o'clock at the latest."

These orders must be borne in mind if the cold store is opened at all on Sunday.

[4] Many cold store regulations contain this clause: 1. That calves must only hang in their skins for thirty-six hours in the cold store, and that they must not come in contact with any of the other meat. 2. That meat which has once been taken out can only be hung up again in the cold store if it is first examined most carefully by the official in charge, and its quality is found by him to be good. No smoked goods can be allowed in the chambers.

[5] It is advisable that the following addition be made to this par. (par. 6) : The various chambers are not to be overloaded with *fresh* stores in such a way as to retard the cooling operations.

7. Bad-smelling or decomposed meat, loose hides, hair, old tallow, old fat, unscalded tripe, etc., hoofs, ropes, cloths, articles of clothing and tools, with the exception of meat hooks, knives, bone saws, chains, and [1] point hooks for the trolleys, must not be brought into the cold store nor kept there.

If any such article be found in the cold store, it must be removed immediately, otherwise the slaughterhouse officials will remove it at the tenant's expense. A written notice of the removal will be delivered to the tenant, and if he does not make a claim and pay the expenses incurred within twenty-four hours, the article will be sold for the benefit of the slaughterhouse exchequer. If the article is not of any use it can be destroyed.

Blood may only be kept in pitchers with narrow necks[2]. It is permissible to salt and pickle meat in the cold-chamber, but the pickling-tub must be inspected and registered before being brought in. They must be made of hard wood, firm and tight, must stand on feet or blocks six inches high, and must be provided with a closely fitting lid[3].

Meat of such animals as are not killed in the slaughterhouse must *not* be hung in the cold store. An exception can be made in favour of those butchers who are . . . . miles from the centre of the town; further, the slaughterhouse manager is empowered to permit exceptions when necessary.

8. The most scrupulous cleanliness must be observed in the cold store. The tenant is answerable for the condition of the compartment he rents. At least once a week, and certainly on Fridays, the compartment must be thoroughly cleaned; care must be taken that the floors are always dried with a cloth after being washed. The use of great quantities of water is to be avoided.[4] Meat, fat, and

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[1] In many slaughterhouses such articles are not allowed to be brought into the cold store either.

[2] Many managers allow blood to be kept in the cold store in sealed vessels, but this ought not to be done, as the blood very soon decomposes and becomes unfit for the purposes of sausage manufacture. Therefore it must be allowed to stand in narrow-necked cans. The most suitable place to keep it is the pickling-room (as in Cologne).

[3] If pickling-tubs are allowed to stand in the general cold store, which is seldom permitted, particularly in those belonging to guilds, they must be under strict control, as the quality of the cold store air must not suffer thereby. In most slaughterhouses a special regulation book is kept regarding pickling-tubs.

[4] Different opinions prevail as to the mode of cleaning; still, dry cleaning must be decidedly preferred to wet cleaning, as in every case moisture must be avoided in the cold store as far as possible. It is better to leave some spots of blood on the meat to be sold than to bring great quantities of water into the cold store, for the greater the quantity of moisture there is in the air of the cold store the higher will be the demands on the mechanical powers of the cold store

suet must be laid on a clean ledge or on a block raised at least six inches above the ground. Meat hooks must not be hung on the wirework of the cell. Articles belonging to the slaughterhouse management—blood dishes, pails, brooms, etc., must not be locked up in the cold chamber.

9. The rented cells must be kept locked by the tenant. The slaughterhouse management do not consider themselves liable or answerable for any of the stores or articles kept there.[1]

10. The slaughterhouse manager, or his representative, is entitled to enter the cold chamber at any time for the purposes of inspection along with the tenant or his men. The tenant must open the chamber immediately on the request of the slaughterhouse manager or his representative; otherwise the latter may enter as and when he pleases.

11. The tenant can only share his chamber wholly or partially with another if he has special permission to do so from the slaughterhouse manager.

There are exceptions when a chamber can be shared between two[2] persons at most for their common use; the tenants in this case must decide between themselves which of them is to be held responsible to fulfil the obligations required by the regulations. In special cases both tenants are held liable for the rent conjointly. The sub-tenant has to have his key made at his own expense, and is bound to give it up when he resigns the use of the chamber.

12. After the expiration of the time stipulated in par. 1, the letting contract ceases and determines. The chamber must then be given up in the same condition as it was when the tenant got it, and thoroughly clean. Any repairs or cleaning required must be done at the expense of the tenant.

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plant, and so much the greater will be the expense to keep this up. It will suffice if the chambers are thoroughly swept several times in the week with a wet broom. In Cleves every occupant of a chamber has to pay ¾d. a week for the cleaning of the place.

In the guild cold stores at Stralsund small zinc vessels are placed under the larger pieces of freshly killed meat, to catch any drops of blood which may fall. These vessels must be thoroughly cleaned on a certain day every week by the occupants of the chamber.

[1]After the experience of several fires (Königsburg and Stolp) it is recommended that the meat should be insured against fire. The premium is little more than one per cent., and thus if there is a fair store of provisions in it, as is already done in several places, the cost would be trifling.

[2]It is not advisable to let out one cell to more than two persons unless it is at least fifty square feet in area, because care must be taken under all circumstances that the pieces of meat do not hang too closely beside or above each other, as often happens. In such cases the air will not reach it freely, and the surfaces of the meat will be moist and greasy where they touch each other.

13. The tenant subjects himself to a fine amounting to three shillings as a maximum for every case of contravention of the foregoing regulations, whether committed by himself or by his workmen[1]. The amount of the fine, which must be paid into the slaughterhouse treasury within three days, is settled by the manager. A complaint as to this fine can be made to the magistrates within three days, and their decision is final.

In cases of repeated offences the further use of the cold store can be forbidden to the tenant for the remainder of the time of the lease, without being released from paying the full amount of the rent.

14. This contract must be drawn up in duplicate, and the tenant must bear any expenses of stamping, etc.

15. Special remarks..... .....

2. THE HORSE SLAUGHTERHOUSE.

In a large number of towns in which the meat control generally is faulty or defective, it is found that there has been a strict supervision for a lengthened period over everything connected with horse slaughtering, public as well as private. Indeed, public horse slaughterhouses have been in existence in many towns long before there was a common modern public slaughterhouse. In Berlin, for instance, one was put up in 1847.

The fact that the former aversion to horseflesh is yielding to the arguments to the contrary, which are founded on sound reasons; the disproportionately high price of meat; but, especially, the protection which is afforded to the public by the inspection of horse slaughterhouses; are all causes which are leading to the continual increase in the consumption of horseflesh; for while until the year 1850 only a knacker could kill horses, and as all that the knacker gets is carrion, for this reason horseflesh, however good in quality, was regarded as carrion, and therefore was very seldom found in use as an article of diet. In the year 1888, by a Ministerial decree, the carrying on of horse slaughterhouses is made subject to various regulations, and knackers are forbidden to sell horseflesh as human food until the body has been examined by a veterinary surgeon and pronounced

[1]The general Statute Book of Common Law says: "Should anyone knowingly appoint an unskilful servant for any work, he is liable to refund all the damages caused to a third party in the performance of that work by the incapability of that servant." According to Article 1384 of the Civil Code, "one is not only answerable for the damage he does himself, but also for that done by persons for whom he is responsible, or who are under his protection or charge."

sound. Since then many horse slaughterhouses have arisen. There were about 314 in the year 1894 in Prussia alone, besides those in almost every slaughterhouse.[1]

In every town in which there is a slaughterhouse, possessing compulsory regulations as to slaughter, it must therefore be stipulated that horses can only be killed in these, and then, as required by the board of control, only in a special building. Therefore, when larger slaughterhouses are being planned, it must be taken into consideration that a horse slaughterhouse will be required eventually, and that a place must at least be reserved for it. Although there is no actual reason for it, still it appears right that the horse slaughterhouse should be so planned, that it can only be reached from outside by a special entrance, and that from inside it should only be accessible by the slaughterhouse officials. Such arrangements are suggested in deference to the aversion that still prevails against horseflesh; for any sufficient reason why horseflesh should not be brought into contact with other meat does not exist. The separation is made so as to prevent fraud, although it is more likely to occur outside the slaughterhouse.

As regards the building itself, it can be fitted up according to present needs, still it must always be seen to that a slaughter-room exists fitted up with windlasses and the other necessary appliances for the slaughter of at least two horses, and likewise stabling for the same. Tubs must also be provided, on one side of this slaughter-room, for cleaning the entrails, and must be supplied with hot and cold water. There must also be the necessary utensils, such as trolleys, tables, etc. In large slaughterhouses there is sometimes a special room for the horse tripe, and the whole horse slaughtering establishment, and the so-called sanitary buildings, have a Freibank adjoining them and a room for cooking the meat.

We find this arrangement in large towns like Stettin, Hamburg, Elberfeld, Halle, Barmen, Danzig, Dortmund, and also in smaller

[1] Still more striking is the increase of the consumption of horseflesh in other European countries, for instance in Austria, at the slaughterhouse of St. Marx, Vienna, only 1,122 horses were killed in 1862, and 7,060 in 1890. The number of those slaughtered rose in 1894 to 18,209. In the same year the number killed in the slaughterhouses of Berlin, Breslau, and Hamburg was, for the three towns, 4,969. The consumption of horseflesh is relatively great in various smaller towns, for instance, Stolp; for while in Berlin about half a horse may be reckoned to every 100 inhabitants, in Stolp a whole horse is required to every 100. In the year 1894 the consumption rose to about 23,186 horses, 3,803 asses, and thirty-two mules, as well as 11,275,000 pounds of meat. Morot, in his "Des Progrès de l'Hippophagie," reports that in Paris there are now eighty horse slaughterhouses.

towns like Wesel, Cleves, Potsdam, Riesa, Gera, Freising, Gotha, Rheydt, etc. All these have a separate entrance from outside.

In a number of towns, especially in the kingdom of Saxony, there is a slaughtering place for dogs connected with the horse slaughterhouse, as in Leipzig, Grünberg, Quedlinburg, Dresden, Chemnitz, Zwickau, Zittau, etc.[1] A dog slaughterhouse has just been erected in Munich.

3. THE "FREIBANK."

The Freibank* is a place of sale within the premises of the slaughterhouse for meat possessing peculiarities which make it otherwise unmarketable, but which is nevertheless not injurious as human food. The great importance of this institution will be more closely gone into in Chapter XII. under "The Utilisation and Destruction of Rejected Meat." In this place we shall only discuss the necessary buildings for a Freibank.

It must be observed, by the way of introduction, that in every case it is expedient to choose such a situation that the buying public comes very little, or not at all, in contact with the actual slaughterhouse, but rather, if possible, can enter the saleroom *direct* by a *separate entrance from outside*. But as of late it is mostly only cooked meat—in many slaughterhouses exclusively such—that is offered for sale in the Freibank, there must be, in a room adjoining the actual place of sale, arrangements for the cooking of this meat, and as steam is the most suitable method for the purpose, it must not be too far removed from the boiler-house, unless a special small steam-boiler is fitted up for the purpose with a cooking apparatus attached to it. This is gone into in Chapter XII.

For the reasons stated, the choice of a suitable place often offers difficulties, as both points have to be taken into consideration—to avoid the general slaughterhouse being entered by the public and to make the distance from the boiler as short as possible.

In almost all new slaughterhouses, such as Cologne, Hamburg, Elbing, Stettin, Danzig, Landau, Riesa, etc., the Freibank are directly accessible from outside, also in various older establishments such as Erfurt, Wiesbaden, etc.

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[1]The number of dogs slaughtered amounted, in 1896, in Leipzig to 11, Chemnitz 251, Zwickau 45, Zittau 25, Bautzen 12, Meran 40, Freiberg 5, Riesa 3, Quedlinburg 177. In the whole of the kingdom of Saxony 399 dogs were killed in 1896.

*See note, page 85.

A large Freibank-house, consisting of several rooms, has just been built in Berlin, the sterilising apparatus being fitted up in the basement of the same building. In other places it is placed just at the entrance, as in Wesel, Weissenfels, and Gotha. Sometimes the police slaughterhouse is used for this purpose.

In those places where the slaughterhouse lies at a *great* distance from the centre of the town, the public, as a rule, object to come so far, and so it is occasionally quite useless, though it is in great demand; therefore a Freibank has been erected in the centre of some towns, and in larger towns there is one for every different quarter of the city. These are very primitive affairs, and are sometimes only common stalls.

Places of this kind in various parts of a town are found in Halle, Hagen (4), Zwickau, Leipzig (4), Dresden (2).

The transport of the meat from the slaughterhouse to the Freibank is very costly, and entails a great deal of time; sometimes the covered waggons, specially constructed for the purpose, get much overloaded.

A Cologne firm manufacture waggons, which are not only perfectly suited for the transport of the meat, but are so arranged that they can be driven to a stated place[1] in the town, and serve as a place of sale, the sides being let down as flaps, and thus can be used as a counter over which to sell the goods. The waggon has a floor area of 85 square feet, is provided with hooks, etc., so that the meat of three oxen, six or eight calves and sheep, and several pigs may be put in at one time, and also leave sufficient space (40 square feet) for two or three persons besides. The price of this vehicle is £120, but it must be taken into consideration that it can also serve when it is not being used for Freibank purposes, for the transport of meat of this kind going to small butchers who possess no vehicle of their own.

The place of sale must be sufficiently roomy—at least, if this mode of sale is established in the town—to be able to admit a large number of purchasers. Further, it must be fitted up neatly, and be provided with every utensil necessary, and have a special entrance and exit, so arranged (by turnstiles) that the buyers can only enter singly.

[1] In the interest of the butchering trade, hawking in the street by means of these waggons is *absolutely forbidden*.

The new meat-cooking establishment and the sale room in Hamburg are fitted up most beautifully, and are quite pattern establishments.

The following adjoining buildings are only to be found in large slaughterhouses, and it is necessary, therefore, that only the principal points should be considered.

4. FAT AND TALLOW MELTING.

Although the erection of a fat and tallow melting building should be avoided by the slaughterhouse management, on account of the bad smells that arise during the process, still in many cases it cannot be avoided; and if, as happens in many places, the noxious smelling gases that develop are absorbed and burnt in the fire that heats the steam boiler, then the greatest evil is removed. In the fat-melting building, measly and tuberculous pigs are melted down into lard, and glue is obtained at the same time, while the refuse is used as manure.

In the tallow or suet-melting house the suet is used for various purposes. It is a fact that by the connection of this kind of building with a slaughterhouse the production of good fat (for margarine) is vastly increased, and the quality improved.

For larger melting establishments, mostly rented out to an association of tradesmen by the slaughterhouse management, a number of rooms is necessary, which are preferably arranged in three storeys.

In the ground floor there is usually a room for the manager and another for the reception and weighing of the raw material, and additional rooms in which the tallow melted in the upper storey is refined and purified.

The raw materials, after they have been weighed and sorted on the ground floor,[1] are conveyed by means of a lift to the upper storey, where appliances are fitted up for washing and drying the tallow, which is destined for the preparation of the finest cooking fat.

Above the refining room is the melting room; here the tallow is passed through a mincing machine, and is thrown into an apparatus in the form of a pulp, when it is melted by the aid of hot water.

The liquid fat is conducted to the refining vessels on the ground

[1]The fat and tallow from cattle are selected in what is known as the "Search-house" in the United Kingdom. In Glasgow and elsewhere the "searchings" belong to the butchers' association.—Eds.

floor by means of a pipe, and when refined and cleared it is led into barrels on the cellar floor.

In another room of the upper floor there is the manhole of a large cylindrical vessel standing on the ground floor. This cylinder, or digester, is for melting the residuum from the boiler in which the finer fat is melted and for the inferior quality of tallow fat, which is only suitable for industrial purposes. It is afterwards run into barrels and kept in the cellar, which is provided with a refrigerator to accelerate the congelation of the material.

The steam necessary for melting is drawn from the common boiler. Power for this plant can be either taken direct from a small motor for the purpose or be transmitted from the slaughterhouse engine.[1]

There must be a thorough drainage of the floors on each storey: the discharge pipe must be as wide as possible, and must lead into a strainer, where any pieces of fat driven down the pipes are retained.

Although tallow melting buildings[2] have been erected in various slaughterhouses, in some cases they have not been used at all, and in others operations have been stopped on account of improper use, so that it is advisable that every authority, before fitting up such a building, should first consider the possibility of its being a source of income.

In Berlin the tallow-melting house brings in an annual rent of £1,200, in Leipzig £272 10s. (+ £31 for steam), in Halle £175 (= 6 per cent. of the value of the building *without* the fittings), and in Barmen £75 as rent.

5. ALBUMEN WORKS.

Here and there we find works in which the blood, caught in large zinc vessels and not used for the preparation of sausages, is utilised for other purposes. But as this manufacture also develops unpleasant vapours, many of these works have been closed, and many corporations have preferred not to have them at all.

In Berlin, the albumen factory in the slaughterhouse premises brings in an annual rent of £500 at the present time; some years ago it realised three times as much.

[1] Moritz suggests that there should be rooms in the tallow melting building for the salting and storing of skins and hides, and in suitable cases also machinery and appliances for the refining works.

[2] In Chapter XII. will be found a description of apparatus for small tallow works under the heading of "Cooking Appliances for Unsaleable Meat." A tariff for the use of tallow-melting boilers will be found in Chapter XI., No. 6.

In some towns a profitable use is made of the blood, the serum being extracted from it in special chambers and sent in casks to albumen works. Such rooms are fitted all round with stands for the reception of flat vessels for holding blood, in which the blood must stand for a considerable time before the coagulum separates from the serum. The serum is put into barrels and sent to an albumen factory and the coagulum is mixed with sulphuric acid and used as manure.

Blood chambers of this kind are in existence at Barmen (annual lease £15) and Munich (annual lease £40). In Cassel there is a special blood-drying apparatus. The blood, after drying, is ground up for use as manure.[1]

By the fitting up of apparatus for the destruction of animals totally unfit for consumption, as referred to in Chapter XII., a rational utilisation of the blood by drying and pulverising is possible.

6. SKIN-CLEANING WORKS (SAUSAGE SKINS).

The necessity for fitting up a special room for cleaning sausage skins can only arise in large establishments where the butchers do not themselves prepare the skins, this work being done by a special class of tradesmen, as in Alsace and many South German towns where the tripe dealers buy up feet, heads, paunches, etc., and cleanse and prepare these themselves. Usually the skins are cleaned in the general tripe-cleaning room, or special small rooms are reserved for general use. In Barmen the skin-cleaning works bring in £5 5s. a year, in Berlin about £500, and in Leipzig £120.

7. HIDE SALTING AND STORING SHEDS.

In some slaughterhouses a loft over the stables, or even over the slaughter-hall[2] has been reserved as a drying-room for the skins and hides of animals killed in the establishment. This, however, is not permissible on various grounds; for bad odours arise from the skins, and the meat adhering to the hides attracts immense quantities

[1] The albumen works in Hanover have been turned into a factory for "blood-syrup fodder." No results have come to hand as to the use of blood-meal as fodder. The blood-meal obtained in the State Knackers' Yard at Hamburg shows the following constituents: Moisture, 8·29 per cent.; fat, 4·14 per cent.; nitrogen, 11·825 per cent.; raw protein, 73·906 per cent.; phosphoric acid, 1·663 per cent.

[2] In Gotha the hides were dried in an attic over a slaughter-hall, a tax of 2½d. being exacted for an ox hide, and 1¼d. for that of a calf or a sheep. In Hamburg there are some rooms in an extension built on to the tripe-house, which are let out to hide merchants for the preliminary storing of hides.

of all kinds of insects, which give rise to impurities in the flesh of the animals killed.[3]

In some slaughterhouses a basement is used for salting skins, and in the upper storey they are dried. Besides these rooms there must be a room for keeping the finished skins, and an office. If there is a sufficiently large space at disposal, there should be an independent establishment of this kind.

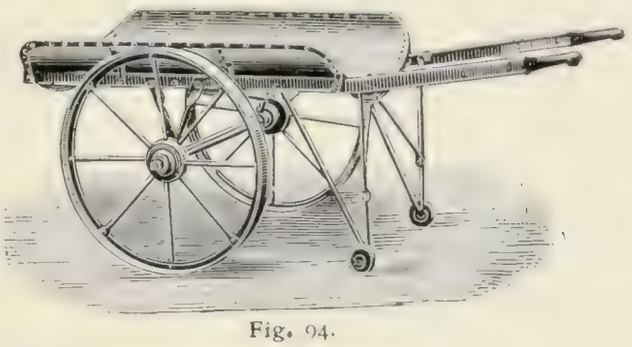


Fig. 94.

There are well arranged hide-salting establishments and hide stores in Berlin (£200 a year rent), Magdeburg, Dortmund, and Barmen (£600). In Leipzig there are three hide-storing sheds and a hide-drying loft.

In Munich-Gladbach, the butchers' guild have let out a part of the slaughterhouse premises there, at an annual rent of 10s., for the erection of skin sheds.

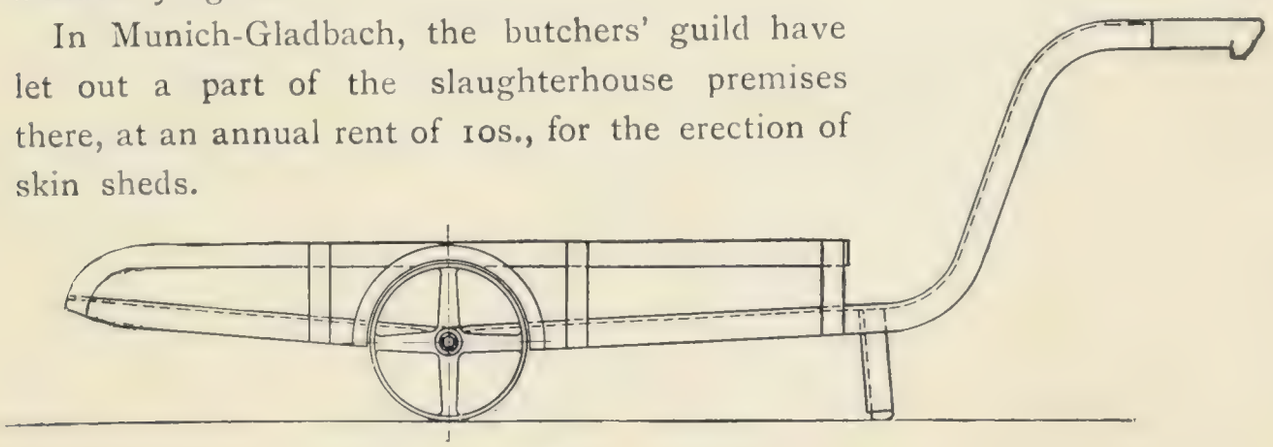


Fig. 95.

[3] In fitting up such industrial institutions the following directions were given by the Minister for Trades and Industries, 15th May, 1895:

"Establishments for the drying and salting of untanned hides.

"(*a*) Animal skins must be dried by being spread out and hung up on lines or on frames. Skin-drying establishments are inconvenient owing to their bad smells, and dangerous because of the stings of insects, which may result in blood poisoning. The erection of such establishments in closely-built localities is, therefore, hazardous.

"The places where the skins are dried must lie high and be as airy as possible. The floor must be watertight. Particles of blood, the water used for cleaning and other drainage, are to be removed in the same manner as the drainage from the slaughter-house.

"(*b*) Hides are salted by being sprinkled with salt on the meat side, and after lying thus for a short time they are rolled up and stacked up one over the other.

"A salt brine containing blood oozes out of these, so that the floor must be watertight and made somewhat on a slope and, if there is no connection with a drainage system, there must be a watertight, covered collecting-pit in connection with the room. As regards keeping and removing of the sewage and any refuse, the orders laid down for the slaughter apply."

To meet the injurious effects of the salt on the walls and floors, the former should be plastered with asphalt, and the latter paved with granite flags, the joints being filled up with asphalt. If less resisting material is used the salt very quickly makes its destructive influence felt.

A public sale of the skins and hides, also some of the tallow fat, takes place in the slaughterhouses at Aix-la-Chapelle, Bielefeld, Bremen, Chemnitz, Crefeld, Dresden, Düsseldorf, Eisenach, Elberfeld, Essen, Hagen, Iserlohn, Coblence, Cologne, Leipzig, Mannheim, Münster, Munich-Gladbach, Remscheid, and Solingen.

Figs. 94 and 95 illustrate some suitable forms of barrows for carrying the hides.

We must not omit to mention that in some slaughterhouses there are "bristle rooms." These rooms are for the washing and sorting out of pigs' bristles ; they must be well ventilated and lighted, and provided with good drainage, etc.

8. SAUSAGE MEAT ESTABLISHMENT.

For the special convenience of the butchers and for the lightening of their industrial operations we find in the larger slaughterhouse establishments rooms provided with mincing machines, these being usually in connection with the cold store. The power needed is supplied either from the main steam engine or from an electric motor. For a small payment, regulated according to the quantity of meat minced, those tradesmen who are not in possession of a mincing machine of their own can in a short time and with little expenditure of labour have their meat minced for them.

Such buildings are to be found on the premises of the slaughterhouses of Baden-Baden, Calw, Cannstadt, Freiburg i/B. (charge for mincing, 1s. 6d. per cwt.), Swäbisch-Gmünd, Göppingen, and Leipzig. In the latter city 1s. 6d. per hour is charged for the use of the mincing machine.

9. BATHS.

A bath room, even though of the simplest kind, should be provided in every large and medium slaughterhouse, because such appointments are not only hygienically of great importance, especially for workmen whose handicraft offers ample opportunities of their being soiled with all sorts of filth, but also because by this means the sense of cleanliness will be developed in a high degree.

These baths must be fitted up in the neighbourhood of the hot water tank. The most suitable is the shower-bath, the only difference between it and the slipper-bath being that it is considerably less costly to work and to manage, and permits of more abundant use.

For each douche a room of eighteen square feet is sufficient, ten of which are for the actual douche, and eight for dressing in. This can be simply fitted up with a stool and a peg for hanging coats on, or, if more luxury is desired, with a looking-glass and a boot-jack. This is separated from the douching room either by an oilcloth curtain or a partition. There should also be a partition between each douche. The floor should be on a slope, and covered with laths. Two douches will be enough for a medium-sized factory. The best and safest method of heating the water so as to prevent scalding is by means of a counter-current apparatus or a mixing-cock, or by a safety mixing apparatus and spray douche.

It has been proved by experience that such shower-baths for the workpeople can be made to pay if 1d. is charged for each, including the use of soap and towels; but it is advisable that these baths should be free of charge, exclusive of soap or towels.

In the slaughterhouse at Magdeburg there are three small rooms, with shower-bath appliances, for the butchers, and one for the officials. There 1d. is charged for a towel, but the bath itself is *free*. In Leipzig there are four shower-bath rooms, and a large slipper-bath for the officials. All of these are supplied by a counter-current apparatus. In Gotha there are likewise bathing appliances for masters and men, and in Gera there is also a shower-bath. In Dortmund the bath rooms have been given up on account of their not being in sufficient demand.

As the principal plant (steam and water) for baths is already in existence in public slaughterhouses, the *public baths* should be connected with such an institution. They are sure to pay, because they can be so cheaply managed. This has already been done in Duisberg and Finsterwalde.

10. ASYLUM FOR DOGS.

It is mainly owing to the exertions of the Society for the Protection of Animals that there have been added, to some at least of the slaughterhouses in the larger towns, special rooms for the purpose of keeping dogs until they are restored to their proper owners or killed. It is very convenient to have a dog asylum adjoining the slaughterhouse, for in that case no extra man is required to look after it, neither is there lack of food or straw, and when killed the bodies can be quickly destroyed, or in cases of emergency turned to the best advantage, and the public are offered

the security that no abuse will be done to the animals caught and kept. For smaller towns a room furnished with several partitions or cages is quite sufficient; while for larger towns there should be a room for a special keeper and a killing chamber.

Of late experiments have been made in killing the animals by causing them to inhale carbonic acid. To effect this they are put into a cemented pit, or a drum-shaped receptacle, filled with carbonic acid. This causes a speedy and painless death, and also permits of an optional utilisation of the dead body, which would be valueless if poisoned, for boiling down the fat for the use of consumptive patients, ostensibly as a cure for tuberculosis. Dr. Ward Richardson, of London, has adopted a new method in Battersea Park, whereby the animals to be killed are pushed in a cage moving on rollers into an apparatus that can be charged with chloroform or carbonic acid, when they are instantaneously killed by the admission of the poisonous vapour.

Of late efforts have been made to establish buildings and appliances for pickling on the slaughterhouse premises, so that tradesmen with small businesses may be enabled to pickle cheaply in the summer; but the results have not been at all satisfactory as yet. At the Paris Exhibition of 1867 a pickling apparatus was exhibited, called the auto-cure, and it consists of a horizontal cylinder of about 6ft. 6in. in diameter. One side of this is closed; the other can be opened. The material to be pickled can be laid on low trucks, so that the pieces do not touch each other, and pushed into the cylinder on rails; the apparatus is then closed, so as to be air-tight, and the air is pumped out of it. This takes an hour. Then brine is pumped in for two and a half hours, with a constant raising of the pressure till about 12 lbs. per square foot. Both pressure and suction pump are worked by steam. Five hours later the meat is perfectly pickled. The brine can always be used again, and pickling can be done at any time of the year. The meat should increase in weight about three to four per cent.

The newest method of pickling is that invented by the Danish zoologist, Aug. Fjelstroop, by which the entire arterial system of the body of a well-bled animal has been injected from the heart outwards.

In the slaughterhouse at St. Petersburg there is a workpeople's kitchen, to the upkeep of which rich meat butchers contribute.

CHAPTER VIII.

PURIFICATION OF SEWAGE AND UTILISATION OF MANURE.*

GENERAL REMARKS ON THE PURIFICATION OF THE SEWAGE.

The cleansing, purifying, and draining off of the waste water from the slaughterhouses is hygienically of great importance. Sanitary authorities devote their special attention to this point, the penalty for negligence being the closing of the entire establishment, for by an inefficient arrangement of the drains the surrounding ground is injuriously affected, and at the same time a propagatory ground is prepared for a number of noxious germs. According to R. Koch, the following points must be observed in the cleansing of the water :

1. All the material for infection contained in the sewage must be rendered harmless.

2. The sewage must be so altered in condition as to prevent its becoming putrid and smelling in the drains, as it is prone to do, because floating material of organic origin, such as blood, pieces of intestine, the contents of the intestines, brain, etc., and other bad-smelling, putrefying substances are plentiful, while oxygen is not present at all, or only in minute quantities.

According to Koch, it is just this lack of oxygen which is the cause of the development of the poisonous gases, as it is this which prevents the oxidation of the destructive products of the microbes.

Seeing, therefore, that the carrying out of a proper system of purification of sewage is always a matter of the greatest importance, it must more especially be insisted upon, in the interests of the State, in the case of slaughterhouses situated on the confines, as epidemics may easily be spread into a neighbouring state by the garbage and all sorts of animal refuse discharged.

*This subject has been brought up-to-date by the addition of descriptions of various important English systems not mentioned in the original work.—EDS.

It must be added that if the use of water is not spared in a public slaughterhouse (and it *must* not be spared),* the refuse becomes exceedingly diluted, and if there is a refrigerator, and a great quantity of cooling water is used, this thins it still more, yet it appears to many to be hazardous to lead it directly into running water without a previous purification, as is done in some slaughterhouses, even if the connection is made below the town.

Without taking into account that the latter is not everywhere the case, but rather that in many cases the sewage is led into the stream *above* the town, a method of this kind, although it is very cheap and simple, is in opposition to the principles laid down by science. By reason of numerous chemical bacteriological investigations in connection with the conditional impurities of rivers and streams by the sewage led into them, and the lesson learned from these that running water has a self-cleansing power, people have again begun to lead sewage, particularly that from slaughterhouses, directly into rivers. This action is defended by Pfeiffer, amongst others, who believes that it is more on principle than from actual reasons based on fact that sewage is not led into rivers, for according to his calculations the sewage of the town of Wiesbaden can be daily estimated at 19,680 gallons, containing 13,200 pounds of organic substance, which becomes mixed with about 154,700,000 gallons of Rhine water (that is, about 175,000 gallons per second), so that the mixture of organic material in every gallon is only exceedingly small. The Fishery Association of Brandenburg have also expressed an opinion that the sewage of the slaughterhouse, as contrasted with the ordinary sewage of the town, has done *no damage* to the fishing,† but on the contrary, at Spandau, has rather attracted the fish, especially when fæcal substances and the like have been carefully intercepted in the gully and the cesspool.

But, still, the objection has not been quite thrown aside, because it is a fact that the *direct* leading of the sewage into the rivers has from time to time brought germs of disease into the latter in great quantities, which keep alive for some time in the running water, and

* According to calculations made by Friedrich & Co., Leipzig, the yearly average shows that about 135 gallons of water are used for each animal killed.

†Par. 43 of the Fishery Law for the Prussian State, of 30th May, 1874, stipulates thus: "It is forbidden to throw, to lead in, or have led into the water material out of economic or *industrial* businesses of such a quality, or in such a quantity, that other fishery rights are injured thereby."

therefore have contributed to the transmission of disease. Therefore, sewage must not be led into running water until it has been subjected to a clarifying and a chemical cleansing. The different methods of doing this will now be exhaustively discussed.

The simplest and cheapest method is by leading the water into a general drainage system, from which it is delivered into the sewage of the town, to be dealt with altogether.

THE PURIFICATION OF THE SEWAGE.*

Sewage may be purified as follows:

1. By mechanical filtration or deposition, by means of which the dissolved constituents are removed.
2. By chemical action, by means of which the dissolved constituents, especially those containing nitrogen, are removed.
3. By bacteriological treatment, by means of which the microscopic organisms, especially the dangerous conveyors of infection to mankind and animals, are removed.

Efforts are made to attain all these ends by subjecting the sewage to filtration, and at the same time treating it with substances which will transform the constituents in solution, or a part of them, into indissoluble combination. The latter are then separated from the water by the filtering, together with the undissolved constituents at the outlet. For this purpose the sewage is either brought to the sewage farm for purification or the purifier is brought to the sewage. On sewage farms filtering and chemical and bacteriological cleansing are carried out simultaneously, and by the same means —the ground. In purifying works first the chemical action takes place, and then the mechanical filtration, while the bacteria are either removed at the same time as the chemical or the mechanical cleansing (different means being required for each of the latter), or after both by still another sort of treatment.

A really perfect method of cleansing has hitherto not been invented. The mechanical filtration is always certain to be thoroughly done by all the best methods; but there is often very much to be desired as to the chemical and bacteriological cleansing by most methods, although it cannot be denied that on some of

*For a detailed account see Dr. J. H. Vogel's book on the utilisation of municipal sewage ("Die Verworthung der Städt. Abfallsstoffe," Berlin, 1894). The author has relied very much on the above book in this chapter.

the purifying works proposed of late very satisfactory means have been put into execution as regards these points.

I. MECHANICAL DEPOSITION OR FILTRATION.

Mechanical cleansing by means of sewage farms has been found of little or no use as yet for slaughterhouses, and opinions vary as to the value of such a method.

Two objections have been raised against them—first, they are not a success financially; second, they are not hygienic. The first point may be disregarded here, as it only plays a part in the sewage of a whole town, but the second claims all our attention. It has

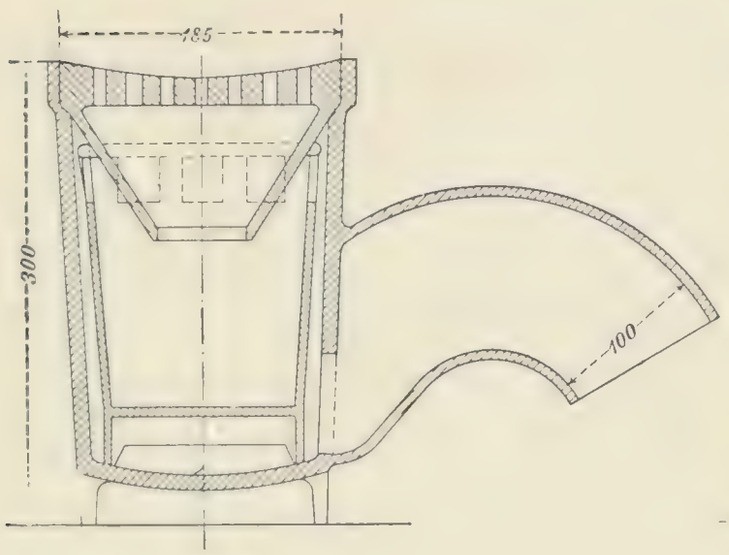


Fig. 96.

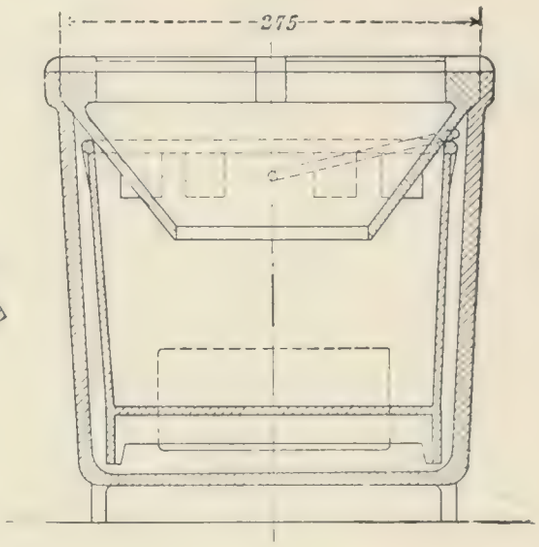


Fig. 97.

been maintained by many for some years back that sewage farms cannot be proved satisfactorily to keep back and remove infectious substances—typhus bacilli, for instance—which are led to them in the sewage. Thus they present a danger to their neighbouring and remoter surroundings, into which the pathological germs are spread. These doubts are to some extent confirmed by Virchow, Wehl, etc., so that the question still awaits a final settlement. In any case, the fact that during the twenty years the Berlin sewage farms have been in operation there has been *no* case of transmission of infectious germs speaks strongly against some of the doubts cast upon the system.

Before proceeding with the description of the various modes of mechanical cleaning, it will be as well to consider the course of the sewage from the various rooms of the slaughterhouse. The waste water which collects in the gutters of the slaughter-houses, stables, and the tripe-cleaning house, etc., flows into

gullies in the various rooms in different numbers according to the area of flooring there is to be drained. They are mostly arranged at the end of the channels, or if these are very long, the fall is so arranged to allow for one in the middle as well. These gullies are cast-iron boxes (figs. 96 and 97) sunk and built in below the floor. They are square, and on the top there is a grating to intercept the coarse pieces, and below the grating there is a funnel-shaped plate, which leads the water, thin blood, etc., into a pail, the upper edge of which is perforated so that the water may run out, while the solid matter remains at the bottom. This pail may also be made of closely-meshed wirework. The water from the pail rises until it overflows into the drain, and thus forms a stench-trap, which prevents the escape of the foul gases into the rooms. The drain-pipes, which usually consist of glazed earthenware, must not be too small—never less than four inches wide—in order that stoppages may be avoided ; they must have a good fall, and the side branches must turn off with an easy bend.

The solid matter which collects in the gully pail is emptied into the manure waggons daily, and thoroughly cleaned. This can be done several times in the day if necessary. In summer it is also disinfected.

A further accumulation of solid matter is found in the system of drains in the yard where there are large manholes. These are best made of hard bricks, well jointed in cement, and about three feet square in the clear ; and where the drains discharge from the various buildings they must not be more than thirty to forty-five feet apart. These manholes or cleaning pits must be covered as in streets ; but they must be opened at least once a fortnight in summer, so that too much solid matter is not let through into the real purifying establishment. This method of preliminary cleaning is necessary, even if cleansing or clarifying is afterwards adopted.

The simplest and cheapest, but at the same time most imperfect, modes of cleansing drains are by settling tanks and filters. The former may exist alone, but the latter are usually found in connection with tanks. These tanks, which receive all the sewage by means of a main drain-pipe, consist of a series of chambers (fig. 99, page 220, ground plan), the size of which depends on the extent of the business, but the larger they are the more effectual they are. The chambers are walled spaces, having an opening into

the next chamber at a certain height above the floor, usually 1ft. 6in. to 2ft. When the first chamber is filled with the fluid to be cleared, the solid material contained in it nearly all sinks to the bottom while the fluid matter slowly flows into the second chamber, from there into the third, then into the fourth, each time leaving a deposit of solid matter on the floors of the chambers. Finally it finds its way into a spiral passage, in which there is further escape of foul matter, and at the end of which there is a pipe leading either into a drain or direct into a stream of running water. The slower the sewage flows the more solid matter will be retained. This solid matter which accumulates at the bottom must be removed at stated intervals.

Undoubtedly the greater part of the solid matter in the manure water sinks to the bottom if it is allowed to stand for a short time (half to one hour). But there always remains a minute fraction in suspension, so that it is never possible to resolve the effluent absolutely into two parts, a sediment and a clear fluid floating on the top, by simple settlement. The fluid standing on the top of the sediment has always a muddy appearance. Further, it has been satisfactorily ascertained that the more a tank gets filled with sludge, so much the less solid matter will be deposited; instead, it so happens that if the tanks are filled with a certain quantity of sludge the liquid flowing through them collects more solid matter. Therefore the tanks must be cleaned out frequently, or their purpose will not be properly fulfilled. Fig. 98 represents a suitable apparatus for cleaning out the manholes.

The filters serve principally for the purpose of freeing the sewage from deposits and floating matter. Filtering only obtains importance after as great a quantity as possible of dissolved matter has been changed by the chemical agency of precipitants into an insoluble form. In spite of this fact, we often see filters used where there is no addition of chemicals, the result being that a sediment is formed at the bottom of the filters.*

*This is confirmed by the recent experiments at London, Leeds, Leicester, Manchester, etc., in what is termed the Dibdin system of bacterial filtration, in which it was proposed to purify sewage by passing it through a series of filter beds without previous sedimentation in tanks. The result was that the filter beds sludged up and lost capacity at the rate of about six per cent. per month, so that in the space of one year and a half the filter beds would be entirely choked. To avoid this it has been admitted by the most ardent supporters of filtration, or bacterial contact, which is simply intermittent filtration, that the previous deposition of solids in a tank is a necessary preliminary, and the latest experiments show that the more complete the deposition of both suspended and dissolved solids by chemical precipitation the more thorough is the action of the subsequent filters, and the greater their longevity.

Filtration can be either ascending or descending; the lateral mode is similar to the second of these methods. Ascending filtration, which is adopted in the establishment for the cleansing of sewage described below, has the disadvantage of not being able to admit in sufficient quantity the oxygen necessary for the oxidation of the injurious matter, while the cleansing and renewal of the material for filtering is attended with difficulties. These disadvantages are overcome by the other methods. Lateral filtration is effected by means of a sloped wall of filtering material on the side facing the course of the pipe through which the water pours. Both lateral and descending filtration, especially the former, give ample opportunity for contact with oxygen, and the filters can be easily cleaned and renewed. Still, it is often difficult to find sufficient space for them. Turf, gravel, coke, charcoal, and sand can be used as filtering material.

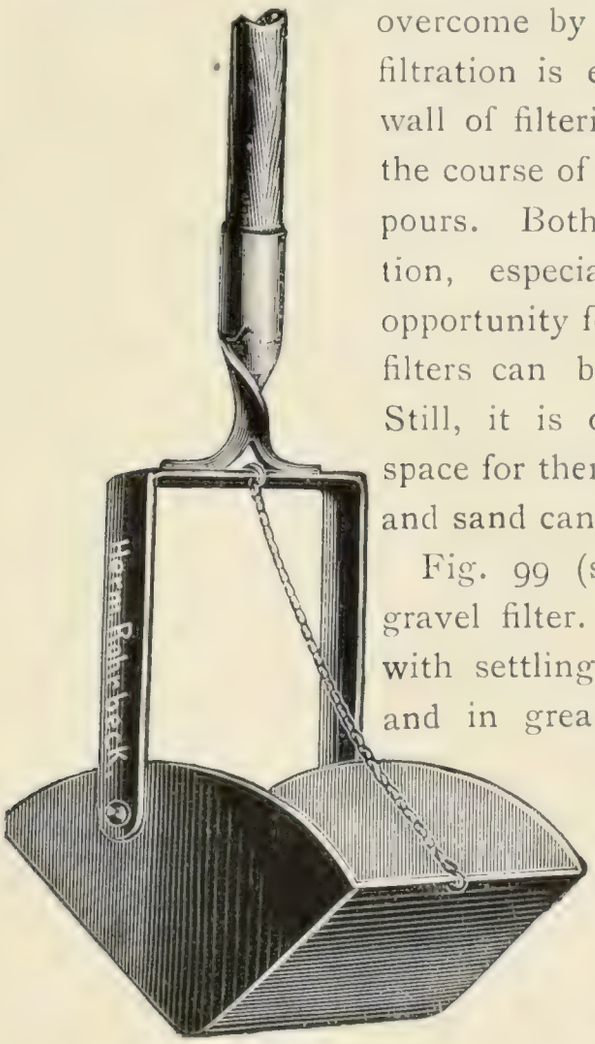


Fig. 98.

Fig. 99 (section) is an illustration of a gravel filter. It is to be found in connection with settling tanks, and is in common use, and in great favour because of the small cost of fitting it up; but it is imperfect throughout as a method of clearing. The liquid is led from the tanks through the spiral passage by means of an iron pipe reaching almost to the ground into a thoroughly water-tight underground cistern. In this there is a final deposit made of solid matter, which is pumped up and carried off every eight or ten days, while the water is forced through a bed of pebbles, which is covered by a layer of clean gravel from eighteen to twenty-seven inches thick, and rests on iron supports and girders. It is very annoying if the cistern is not made thoroughly water-tight, and there is an influx of subterraneous water, for then the matter falling to the bottom does not lie there, but rises up and presses against the filtering bed, where it becomes in a short time like wet turf, and the

water can hardly pass through it, and produces stoppages in the tank, and, indeed, throughout the entire system of drainage.

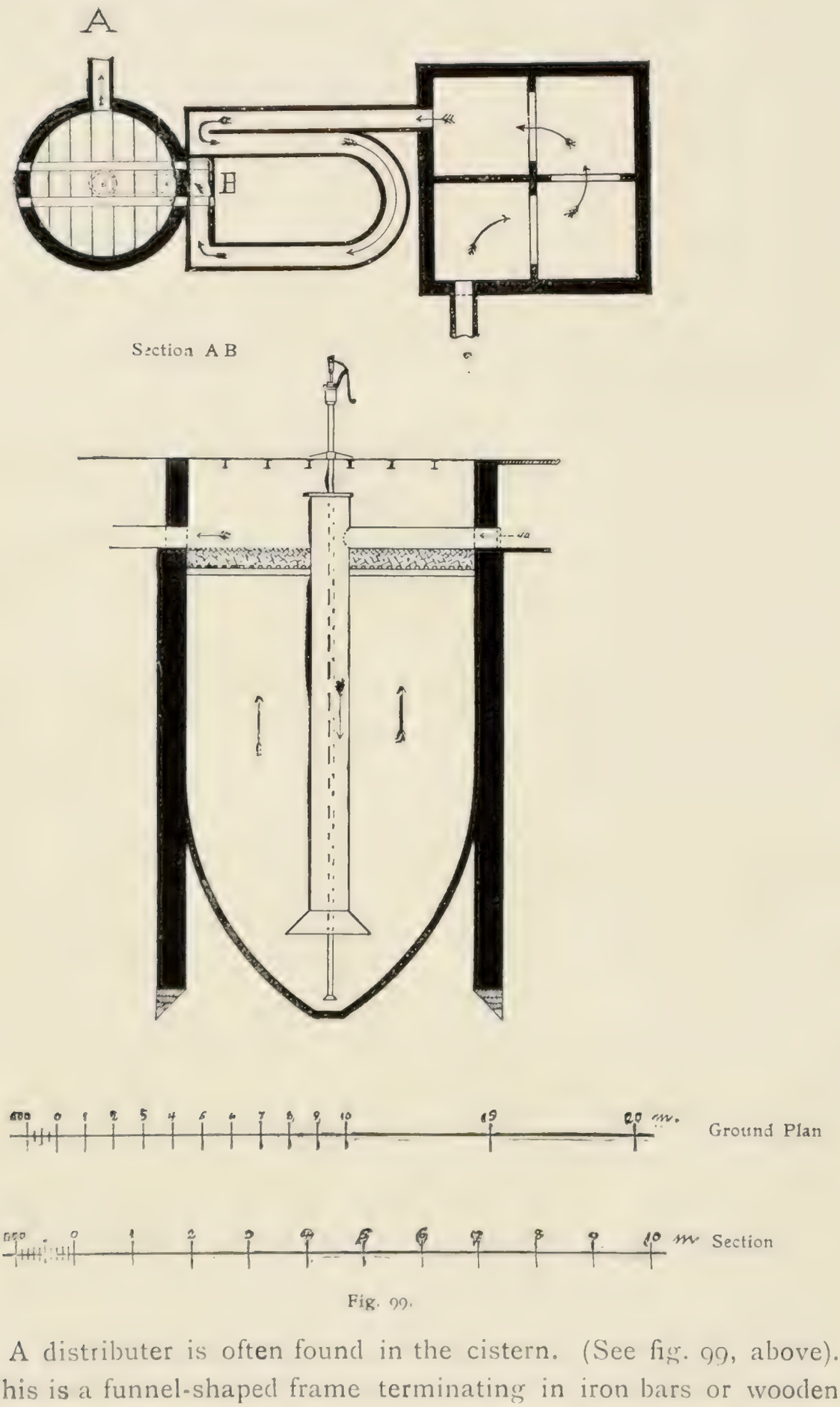


Fig. 99.

A distributer is often found in the cistern. (See fig. 99, above). This is a funnel-shaped frame terminating in iron bars or wooden

laths placed one over the other, like those of Venetian blinds, the opening of which faces downwards. This works not only as a distributer of the current, but at the same time it catches the matter, which sinks to the bottom and prevents it from rising again. The chambers should be cleaned as often as possible by means of sludge pumps, chain pumps, or mud elevators, and the underground cistern also must be cleaned out three or four times in the year, provided that there is no stoppage of operations in the manner described above. If the gully and the sinks are carefully cleaned, the operations in the clarifying work are materially lightened.

Some are made (as at Cleve) with a mud and fat-catcher and a sunk pit adjoining it, and for further cleansing a clarifying cistern with a horizontal filter. The sewage flows from the fat-catcher right and left through sieve-like appliances, afterwards unites in this inlet pipe, is cleansed in the cistern, and then flows through two box filters.

The cost amounts to about £60 to £70, to which must be added about £100 to £150 for builders' work.

2. CHEMICAL PRECIPITATION.

Sewage may be much more thoroughly purified if precipitants are added to the liquid manure, either when it is standing or when flowing at a slow rate. In the course of time a large number of such means have been proposed, only a few of which have been found practicable. The operation of this precipitant must be such as to get it into insoluble connection with constituents in the sewage which are in the habit of forming a sediment quickly, and which will also seize upon either sinking or floating matter.

Precipitation is carried out in several large tanks, so that after the addition of the precipitant the sediment is allowed a more or less perfect rest, and after the lapse of some time the liquid on the top can be run off, or the sewage may be led directly into a suitable receptacle after the addition of the precipitant, and there the separation into sludge and purified sewage can be effected at once.

Opinions as to the actual worth of this method are as yet very much divided. Pfeiffer speaks decidedly against such undertakings; for, according to his opinion, there has not been discovered as yet any means by which all the microbes to be found in the water can be made absolutely uninjurious, and thus the main intention of such an undertaking remains unfulfilled. The greatest use of this

method is that the sewage loses all its foul odours, although only for a short time, and, owing to the addition of the chemical precipitant, the deposit is usually not fit to be used as manure for the land, because the great amount of lime it contains, or its sour condition, permits only a limited use, and thus a part of the possible income is lost.* The point of expense is not so very weighty in the purifying works of slaughterhouses, because the quantity to be purified is not important, and cleaning is all the easier because the constituents of slaughterhouse sewage are always the same, and can always be known exactly, which is not the case as regards the ever-changing quantity of the effluent of a town, where much may be squandered in the addition of cleansing material. From a bacteriological point of view as well, the sewage of the slaughterhouse is less dangerous, as refuse is usually intercepted, if possible, before its entrance into the drains, and removed by means of the waggons for carrying off the manure, while special attention is bestowed upon that which comes from diseased or suspected animals.

The principal precipitant used for the greater number of the suggested methods is lime or lime water.

The best known methods are the following, according to Vogel:

Milk of lime and precipitation of the superfluous lime in the solution by carbonate of magnesia. (Oppermann.)

Lime, aluminium and ferrosulphate. (H. Robinson and J. Ch. Mellis.) 1878.

Lime, argillaceous earth, and salts of iron. (H. Y. D. Scott.)† 1865.

Milk of lime with sulphate of aluminium. (Röckner Rothe.)

Milk of lime, sulphate of aluminium, and soluble silicic acid. (Müller-Nahnsen.)

"Thomas" slag, with and without the addition of milk of lime, sulphate of aluminium, and soluble silicic acid. (Müller-Nahnsen.)

Chloride of iron, proto-sulphate of iron, carbolic acid and water in acid and alkaline form; carbolic acid, hydrate of alumina, oxide hydrate of iron, lime, and water. (M. Friedrich & Co.)

*Note below regarding the conquest of all these objections in the Native Guano application of the A.B.C. precipitation.

†From 1865 to 1877 inclusive this gentleman took out no fewer than nineteen patents for proposed processes, all having a strong family likeness to the one in the text.

Chloride of magnesia or calcium chloride with ferrichloride or alum, or a mixture of the two, to which is added lime-water and carbolic acid. (F. Hille.) 1870.

A salt mixture of iron, alumina, and a combination of magnesia, the composition of which varies according to the sewage; also lime and self-acting cell fibrine, etc. (Dr. F. R. Hulwa.)

Lime and protochloride of iron. (Northampton.)

Lime, protosulphate of iron, and coal dust. (Holden.)

Milk of lime, magnesium salt, and calcium monophosphate.

Milk of lime, sulphate of magnesium, superphosphite, and chloride of magnesium dissolved together, and afterwards filtered through peats or turf. (Schwarzkopff.)

Lime water and magnesium monophosphate. (Blyth.) 1858.

Lime and Glauber's salt (sulphate of soda). (Fulda.) 1872.

Milk of lime and protochloride of manganese. (Knauer.)

Milk of lime and alkaline manganese. (Buhl and Keller.)

Milk of lime and sulphate of zinc. (Société Anonyme des Produits Chimiques du Sud-Ouest in Paris.)

Milk of lime and lute. (Smith.)

The following is a list of methods for the cleansing of sewage in which lime and milk of lime are not used:

1. Alum, blood, charcoal, and clay (whence the name it goes by —A B C process), to which is also added magnesium salt, sulphate of iron, sulphate of aluminium, etc. (Silar and Wigner.) 1868.*

2. Carbon and phosphate of calcium. (Lupton.) 1871.

3. Chloride of iron and hydrated sulphate of lime. }†

4. Metallic iron. (Anderson.)

5. Sulphate of aluminium, carbonate of soda and potash permanganate. (Lenk.) 1865.

6. Alum, animal carbon, and hydrated sulphate of lime. (J. A. Manning.) 1853, and six others up to 1872.

7. Alum, a little silicate of potassium and tannin. (Leigh.) 1873.

8. Phosphate of magnesium. (Blanchard.)

9. Soluble compound of phosphates and magnesium. (Tessie du Moteny.)

*This, together with thirty-six other patents, is the property of the Native Guano Co., Ltd., London.

†This is probably No. 1845 of 1875. M F. Anderson, coprolite, phosphorite and sulphuric acid.

10. Chloride of zinc, borax, silicate of potassium, Iceland moss, asbestos, etc. (J. Hanson.) 1877.

11. Fluor silicum, chlorsilicum, and an alkaline silicate; silicious or boracic fluorine compounded with iron, manganese, aluminium or zinc, etc. (Rawson and Slater.) 1876. Native Guano Co.

12. Sulphate of aluminium and carbonic bone powder. (Le Voir.)

13. Charcoal, protosulphate of iron and sulphate of zinc. (Siret.)

14. Phosphate of aluminium or phosphoric acid clay dissolved in hydrochloric acid. (D. Forbes and A. J. Price.) 1870, and two others.

15. A muriatic acid solution of *bauxit*, to which is added phosphate of calcium. (Guenantin.)

16. Sulphate of aluminium and sodium aluminate and charcoal. (F. Maxwell Lyte.) 1885.

17. Calcined dolomite and ozone. (Oppermann.)

18. Sulphate of alumina and oxide of iron. (Secret method, "Ferrozone," of the International Purification Co., London.) 1886.

19. Turf compounded with iron salt. (Degener.)

20. Oxide of proto oxide of iron (blue stone) compounded with various salts, sulphate of alumina, salt of magnesia, etc. (Hempel.)

21. "Aluminoferric" (sulphate of alumina, containing a small percentage of free sulphuric acid, ferrous and ferric sulphates). (Peter Spence & Sons, Ltd., Manchester.)

All these methods result in the sewage being so much freed from sediment and floating matter that when it flows in a thin stream it appears purified to a high degree, but regard must be paid to its destination. There is a demand for a good method of cleansing that will not only ensure outward purification, but a thorough permanent cleansing, especially if it is to be led at once into running water. It sometimes happens that a river or stream which receives such seemingly cleansed sewage soon becomes impure.

"From a chemical point of view, all the methods in which milk of lime alone, or in combination with other metals, serves as the principal precipitant, are useless, in spite of the fact that these appear the best to the uninitiated in chemical matters on account of the rapid and excellent precipitation of the sediment and floating material—a circumstance which has contributed not a little to the spreading of its use. Where lime is used it very frequently

happens that a part of the sediment and floating material insoluble up till then becomes dissolved, so that the sewage contains a greater quantity of dissolved organic material after precipitation than previous to it, although it appears pure to the eye."

"For many years," says Burghardt, "the method of cleansing sewage by lime precipitants was resorted to, and the results were regarded as thoroughly satisfactory. This satisfaction proves that perfect ignorance reigned as to the real value of such a method. It was believed that sewage cleared by means of lime was rendered not only clear, but also 'pure.' If its cheapness—a great advantage of this method—is taken into consideration, its frequent employment in early years explains itself."

König passes a similarly unfavourable judgment on clarifying by means of lime, also dwelling especially on the dissolving effect of milk of lime on organic matter in the sewage previously insoluble.

"None of the known methods give unqualified satisfaction; some of those which are newly proposed arouse the expectation that perhaps, at last, not only the sediment and the floating matter will be precipitated, but also the greater part of the organic nitrogen, and that the water will thus be perfectly free from all germs, without the entire cost of operations exceeding the present sum expended on those methods which are almost fruitless."

Works for the clarifying of sewage by chemical methods of the simplest kind have been put up in Eisenach, Meran, Mittweid, Ohernik and Rudulstadt by Friedrich and Co.

These also have a fat-trap connecting with a sunk pit, in which there are three sieves with various large openings for outlet. After passing these spaces the water flows to the tanks, of which there are two. The water discharges below by a feed-pipe, which is provided like that already described with a distributing funnel, whereby in consequence of the filtering of the sludge a preliminary mechanical cleansing is obtained. The mud or sludge is filtered in this way—the sewage going into the deep well or cistern or into the upright cylinders is compelled to purify itself while ascending upwards, and is made to flow through the heavy filamentary sludge which sinks to the bottom; the water thus is filtered by itself.

If a tank is to be treated, a valve is closed to prevent the flow of more water into it, and precipitants are then added.

These precipitants are made ready in a laboratory, from whence they are led in a certain quantity, based on experience. First sulphurous acid is mixed with oxide of iron, and then lime is added in the form of milk of lime. The equal distribution of this precipitant in the clarifying pit is attained by means of a series of pipes with outlet supports and distributing valves.

As no machinery is necessary for these small establishments, the mixture of the precipitant with the sewage is effected by means of agitators or steam blowers.*

While the precipitants are added in the manner already described in smaller institutions, automatic arrangements are to be found in larger establishments. For instance, in Barmen, Friedrich and Co. have fitted up cleansing arrangements where the sewage, which is freed from the coarser impurities in the sludge and grease trap, as well as in the manhole, has precipitants added to it automatically by means of a water-wheel, the axle of which is provided with dippers, which become closely mixed with the sewage by suitable arrangements.

There are four tanks for purifying, the inlet to which is regulated by valves.

The sludge out of the tanks is led to a common cistern, from which it is pumped up. This should be done every day, thus preventing the sludge lying for any length of time at the bottom of the basin, and the resulting injurious effect on the water to be purified. The fitting up of these appliances, without builders' work, is about £450.

The method of Müller-Nahnsen is similar to the above (fig. 100).

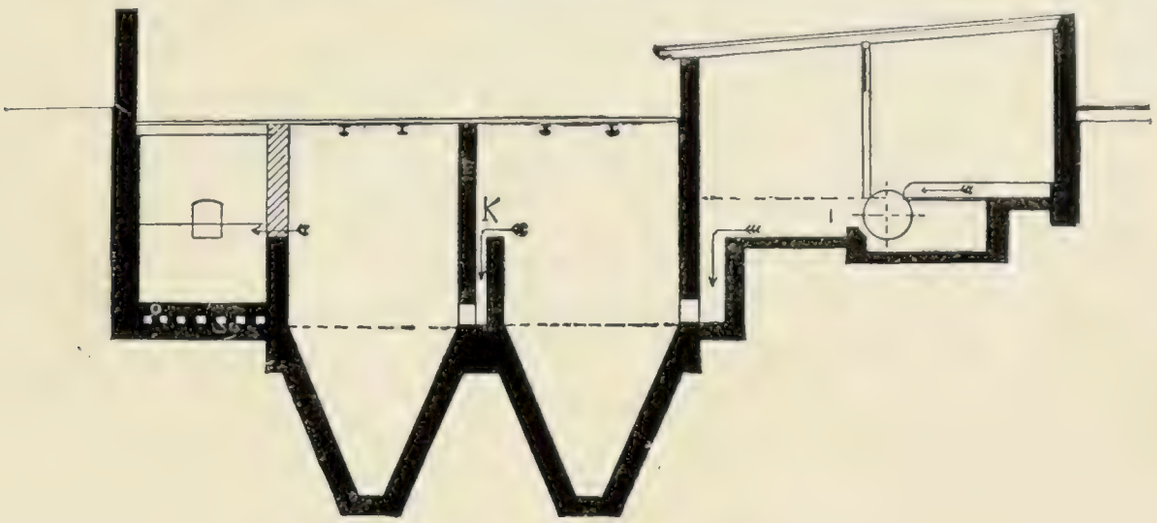
The sewage flows into a preliminary tank (*c*) through a main pipe (*a*), covered by a coarse wire strainer (*b*), near which a second tank (*d*) is placed for putting it out of circuit when *c* requires cleansing. The water then falls by a channel (*e*) into *f*, where a water wheel on a horizontal shaft turns the water-lifting wheels (*g*). The buckets of the latter (*h*) get filled with fluid chemicals (Nahnsen's patent, see footnote [1]), and mix them, while serving at the same

*After the deposit has settled at the bottom, which in these appliances takes about thirty-five minutes, the water becomes clear and can be let off through the movable waste pipe. The tanks in such establishments are very large, so that they only require to be attended to at considerable intervals, and thus any of the slaughterhouse workmen can attend to them along with their other work.

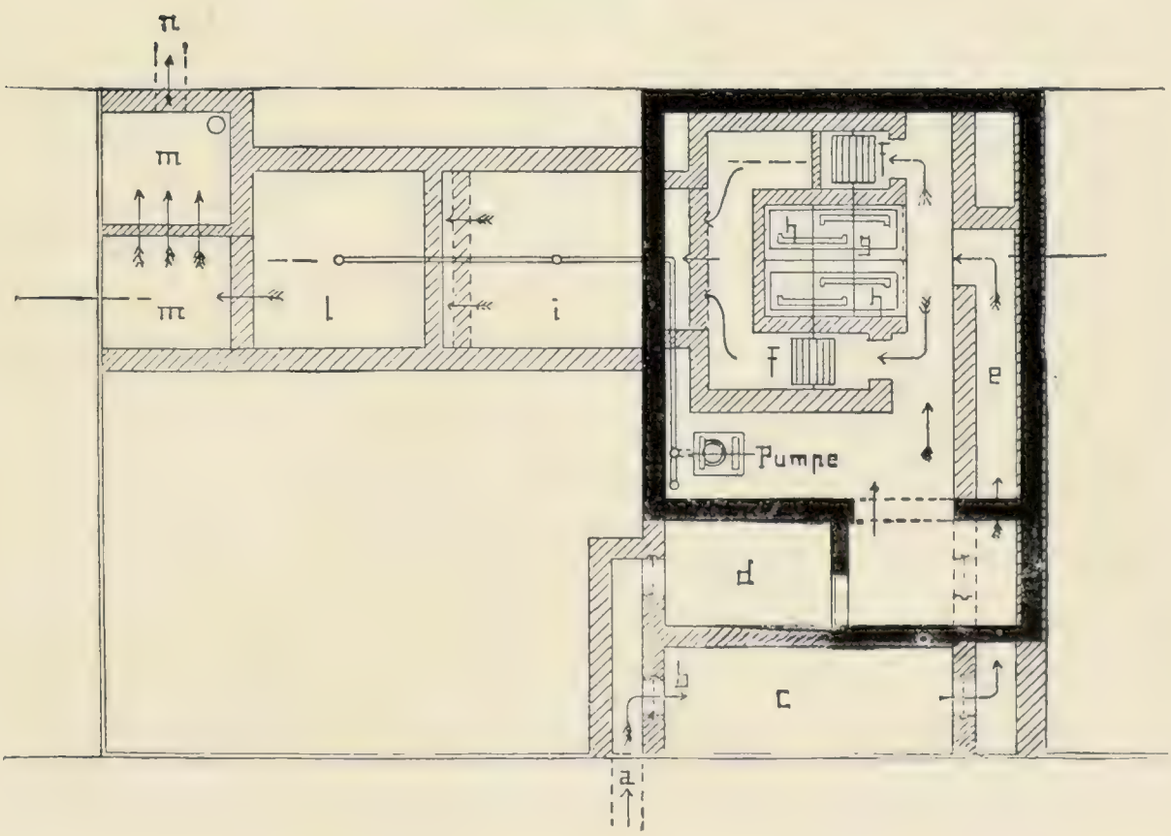
[1] The precipitation is effected by means of milk of lime and sulphate of alumina, which is nominally mixed with soluble silicic acid. In reality it is prepared from a material rich in silica—kaolin—and with this the sulphate of alumina is treated.

THE MÜLLER-NAHNSEN CLARIFYING PROCESS.

Section A B



Ground Plan.



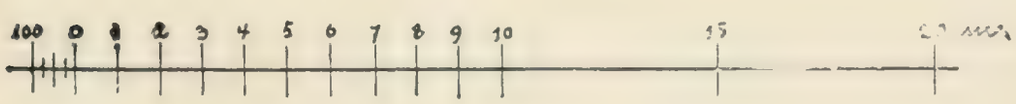


Fig. 100.

time to stir them up with the sewage to be purified, which then flows into the settling tank (*i*), and from here through a special overflow pipe (K) into the second tank (*b*). After it has passed through two gravel filters (*m*), it can be led at will through the eduction pipe (*n*). The sediment is raised out of the clarifying basins (*c*, *d*, *i*, and *l*) by a sludge-pump, in order to be cleared away.

The experiments which have been made with slaughterhouse sewage, cleared according to the Müller-Nahnsen method, have shown very good results; for "the water was clear, free from suspended matter, odourless or only smelling very faintly of alkaline, and eliminating only a very small quantity of carbonic acid lime after standing in the open air, but otherwise remaining in the same condition for an unlimited period." The bacteriological examination was thoroughly satisfactory, the uncleansed sewage exhibiting about six and a half million colonies, and the cleansed only containing about eight colonies on an average, which in five days developed to one hundred colonies.

This method is carried out in the slaughterhouses in Waldenburg, Landershut, Neisse, Remscheid, Oberhausen, Halberstadt, Celle, Reichenbach, Halle, Dirschau, Ohlau, Gerdauen, etc.

Dr. Hulwa's method for the purification of sewage (Breslau) consists in taking the sewage into preliminary cleansing vessels and there freeing it from the coarsest constituents. The sewage from which these have been eliminated, having been freed from mechanical impurities in this first tank, then enters into the real cleansing station, into which a stated and equal quantity of milk of lime and Hulwa's precipitant is run and is well mixed with the sewage, either by hand or by self-acting pipes or a steam injector, by which means the effect of the chemicals is rendered more complete.

The actual cleansing consists in the precipitation of the mass by means of specially-prepared cell fibres of turf, peat, or lignite and the action of iron, manganate, alumina, and salt of magnesia, lime or magnesia being added to it either before or afterwards. Dr. Hulwa prepares his materials according to the kind of sewage to be purified. In individual cases this is followed by saturation of the clarified alkaline liquid with carbonic acid and a very small quantity of sulphuric acid gas, to be regulated according to the cleansing. The sludge obtained by precipitation can be used again for the

drawing off of further quantities of manure water, and in this way is enriched in material for the nourishment of plants. Thus there is prepared an odourless, manageable, transportable manure, suitable for export to great distances, and, owing to its wealth of nitrogen and phosphates, a much sought-after article.

The Hulwa system has obtained for itself an important capability of adjustment by a skilful combination of the chemical and technical portions of the purifying methods. It may be used for the smallest as well as for the most considerable quantities of sewage, and for sewage of the most varied nature, and it allows the clear water to be delivered immediately into the public sewers, thus preventing the most common evil in large reservoirs, the multiplication of sources of fermentation and putrefaction. For the cleansing and clarifying take place in a few minutes; while the work of cleansing goes on without stopping, and the water flows out of the clarifying tank at a rate corresponding to that at which it runs into it as a clear, odourless, colourless fluid. It has been conclusively proved by microscopic bacteriological experiments that neither in water flowing from Hulwa cleansing reservoirs, nor in the sediment deposited, is there a favourable breeding ground for infectious bacteria. Indeed, disease-germinating bacteria of the virulence and capability of resistance of the anthrax-bacilli, which were previously mixed with the sewage, became perfectly powerless after being treated with Hulwa's chemicals.

The expense of working this cleansing material is from about $\frac{3}{4}$d. to 3d. per ten gallons, according to the condition of the slaughter-house water and the nature and dilution of the manure water.

The Hulwa method is in practical operation in Bentheim, in Saxony (800 to 1,200 gallons daily to be cleansed), Brieg, Bromberg, Freiburg i./Sch., Kreuzburg, Marienwerder, Schweidnitz, and Tarnowitz.

In the Röckner & Rothe system the apparatus for mechanical cleansing was invented by Röckner, and the chemicals suitable for the various kinds of waste water are prepared by the firm of Rothe & Co.

This system is as follows: "The dirty water is led into a reservoir, over which the apparatus is fixed. The latter (see fig. 101, page 232) is an iron cylinder A, closed at the top and open underneath, which dips on its lower edge under the level of the

water to be cleaned into the tank B, the bottom of which is sloped steeply at one side. Under the bottom of the cylinder there is a side outlet pipe D, which discharges into a tank fitted up on the outside C, from whence the cleansed water pours into the outlet channel. On the top of the cylinder there is a pipe F, from the uppermost end of which a suction pipe leads to a small air-pump. Now, in order to bring about the cleansing of the dirty water flowing into the reservoir, the air is exhausted by the agency of the air-pump, so that the additional pressure of the outer atmosphere causes the dirty water to rise into the cylinder. If the water reaches the height of the transverse escape pipe, it courses downwards through it into the tank. The level of the water which flows out of the tank must be somewhat lower than the dirty water flowing into the reservoir, so as to form a syphon. The water flowing in rises upwards into the cylinder uninterruptedly, and flows off in a lateral direction. The air-pump has thus only to keep a constant vacuum, and must for this purpose be worked for a short period every day.

It must not be omitted that the under edge of the cylinder which dips into the reservoir must be in a somewhat lower position than the bottom of the discharge channel on the outside, so that the water does not run out of the syphon by the probable equalisation of the height of the water.

The height of the cylinder depends, of course, on the height of the column of water, which corresponds to the atmospheric pressure, and must also be less than 33ft. The cylinders are usually about 23ft. to 26ft. high. Therefore the position of the connection for the air suction pipe must be higher than 33ft. above the surface of the water in the reservoir, so that even if the vacuum is perfect the water cannot enter through the suction pipe into the pump.

The rapidity at which the water in the cylinder ascends is regulated by the greatest quantity of water flowing in the unit of time, and also according to the diameter of the cylinder. The escape pipe is hypothetically wider than it appears from the calculator, so that with rain water exceedingly large diluted quantities of water may still be cleansed with great ascending rapidity. A valve regulates the outflow of the escape pipe.

According to the experiments which have been made up to the present time the speed of the ascending water may amount to from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch per second. It depends on the weight of the

particles of dirt to be separated—the higher these are the less will be the speed. In order to maintain a regular, quiet, upward movement of the water in the reservoir and the cylinder, and thus prevent a strong current and yet keep up a maximum speed, the dirty water is led into an inlet pipe which goes through the middle of the reservoir and extends nearly to the bottom, so that the water is compelled to begin the ascending process from below. In the reservoir there is a distributor fixed on to the descending pipe, so that the water flows out of the inlet pipe by several arms and is given a regular movement in the reservoir. The overflow in the upper part of the cylinder is so arranged that a regular movement of the water is maintained until it flows out of the appliance.

While the sewage slowly rises in the cylinder the heavier impure materials are eliminated, and form into a layer of sludge, which serves as a filter for the water, which falls downwards. When the water ascends to the mouth of the discharge-pipe, it must be liberated from all heavier matter. The compact masses which lie deepest must be regularly removed from the reservoir by means of a chain-pump or a dredging-pump E, and led off by channels into the tank for sludge, or carried off at once in sludge-waggons. The foul gases which collect in the head of the pipe can be sucked up through the air-pump and led off into the boiler-furnace.

Besides this mechanical self-cleansing, there is also a chemical process going on. There is an agitator, or mashing machine, for adding the chemicals, provided with mashing-arms. These move in a mashing-vessel, to the circumference of which beating-plates are attached, whereby a constant powerful agitation of the mixture is maintained. By special appliances an automatic supply of the precipitant is so arranged as to correspond with the ever-changing quantity of sewage to be precipitated.

Each of these supply-regulators consists of a syphon with an eduction-box and float valve, and also a discharge valve, which is raised and lowered by a float, according to the quantity of sewage flowing in.

The sludge is next drawn up into the sludge-draining channels, and here condensed harmlessly by means of rarefied air to thirty to forty per cent. of dryness; the water eliminated from the sludge returns again to the sewage in the mixing channels, and passes again through the appliance with the other sewage. The quantity of

sludge thus formed into a cake, according to estimates made by the inventor, should amount to from two to six pounds for every gallon of sewage.

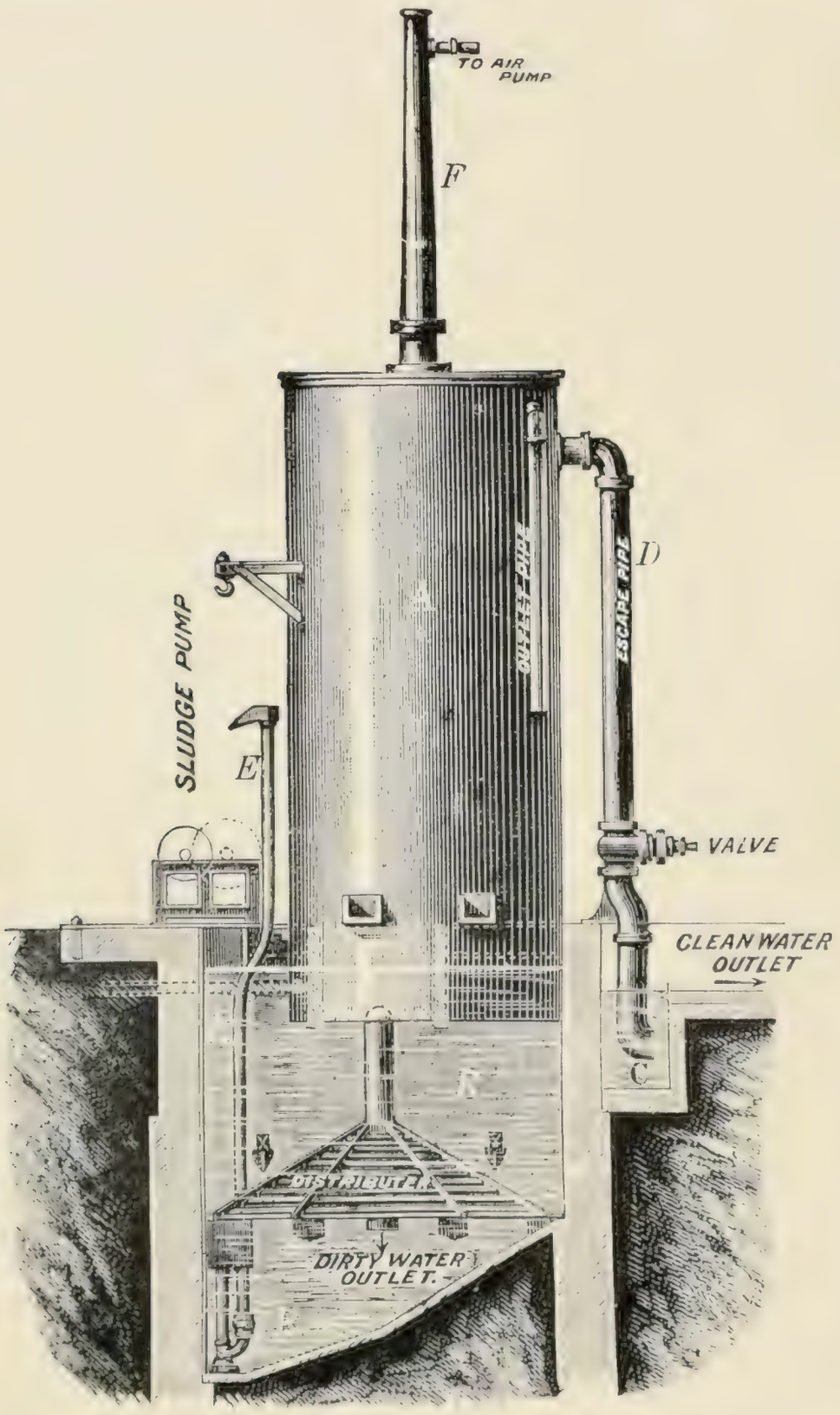


Fig. 101.

Experiments made by Kroskaner and Nocht, on the sewage in the works at Potsdam, prove that :

1. The cleansed sewage was free from both sediment and floating matter.
2. The chemical cleansing was imperfect.
3. The pollution of the river Havel by the effluent thirty feet below the place of entry showed the results to be unsatisfactory.

The Röckner-Rothe method is adopted in Potsdam, Bernburg, and Erfurt.

There is a syphon-bell apparatus in the slaughterhouse at Hanover. The entire working is carried on through the existing pipes, and the air-exhauster mashing apparatus is fed with lime. Water motors work the mashing arms for the mixing of the sewage and the precipitant. The syphon-bell is emptied of air, and kept empty by a water-jet air-exhauster. The sludge is lifted out of the reservoir by means of water-jet elevators.

The reservoir and the syphon-bell are built near a house, which serves at the same time as a workshop, in which the lime-agitating trough and the mashing-machine are fitted up. About 32,000 gallons of sewage can be cleansed daily.

The net cost to fit up such a building is £1,000, half of which is for building work.

The annual cost to work a lime-cleansing sewage works is about £50 to £55. This includes payment of workmen.

All the methods previously described have required the use of lime. By the following methods the precipitation is effected *without* lime :

1. The Ferrozone-polarite system, in use in some English towns, is a method where a precipitant called ferrozone is put into the sewage, which is effected in a very simple manner. The sewage, after its mixture with the precipitant, travels in a narrow stream, with considerable speed, along a passage 160ft. to 200ft. long, and 20in. to 30in. wide, and about the same depth, to a large settling tank, where it must stand perfectly still for about two hours.

If after this time the separation of the sewage into a deposit of mud underneath and a tolerably clear fluid above is effected, the cleansed sewage, on the opening of a sluice valve, is led out from the surface by means of a float with a movable eduction pipe, and so reaches the filter, which consists of a quantity of sand and polarite

in pieces the size of peas. Polarite is a grey-black material, consisting principally of oxide of iron, and sufficiently porous for water to soak through it. According to the statements of the inventor, an oxidation of the organic substances and a loss of colour are effected by this flowing through process; there should also be led over the filter a stream of ammonia in nitric acid. The latter, however, is not used in the experiments made by Vogel.

The filter consists of a pit 3ft. deep, 60ft. to 90ft. long, and 30ft. to 45ft. wide, the bottom of which is laid with porous pipes 3in. to 4in. in diameter. These are placed at regular intervals, the spaces between being filled up with large flints or rubble.

These pipes are covered with a layer of very coarse gravel and small rubble, this layer being about 4in. to 6in. in depth. Next to this comes a layer of sand 6in. deep, next one of polarite in pieces the size of peas mixed with sand, about 18in. deep, and finally on the top 10in. to 12in. of very "sharp" sand. In the middle of the filter there is a shaft for the outlet filled with pieces of polarite. The clarified sewage flows through this filter at a good speed.

The quantity of sludge obtained by the polarite system is far less than by any of the lime methods of precipitation. This speaks very much in favour of the polarite method, for, according to the information gathered by Vogel, the sludge obtained by this method amounts to only forty per cent. of the quantity got by lime precipitation, and it can be confidently asserted that the ferrozone-polarite system is far superior to all the other methods previously adopted. The clarifying depends so much on the filtering that the former cannot be judged apart from the latter.

Amongst the principal advantages of this method the following may be named:

The effluent is not only clear—a point which is easily attained by other methods—but is also perfectly colourless, and can be kept in a bottle for a long time without becoming materially clouded or changed in any other way whatever. Eighty-nine per cent. of the nitrogen contained in the sewage is removed by this method. It thus accomplishes twice as much with regard to the extraction of the nitrogen as the best of the methods previously in vogue in Germany. The organic material dissolved in the sewage appears in fact—according to the statements of the inventor—to be destroyed to a very large extent. The experiments made by Vogel with small

quantities of sewage show that this is really the case, and also testify to its absolute colourlessness.

By the employment of most of the other methods—especially those requiring the use of a great quantity of milk of lime—the contents of the manure-water will be found to comprise a considerable quantity of dissolved organic substances. But as they form the best breeding-ground of all sorts of animalculæ, the extensive removal of organic matter from the sewage by the ferrozone-polarite system and similar is claimed as a special advantage.

2. Hempel's blue-stone method is in the main an imitation of the previously described method. Hempel also first proposed to clear the sewage with sulphate of alumina [$Al_2.(SO_4)_3$], the principal constituent of ferrozone. He prepares for this purpose a precipitant, which consists of seventy per cent. sulphate of alumina and thirty per cent. of his blue-stone, very finely powdered. He holds that precipitation should go on while the sewage is kept constantly in motion, instead of in a state of perfect rest. After clarifying, filtering follows by a filter constructed exactly like the English filter, with alternate layers of sand and blue-stone. Blue-stone is a heavy dark bluish-black substance, which differs from the grey-black polarite in one point, to the advantage of the former, in not having any admixture of slatey material, which substantially increases the difficulty of filtering. Blue-stone is undoubtedly prepared from raw material very similar to that from which polarite is produced; water filters through it with even greater rapidity than through the latter.

According to experiments made with blue-stone by Vogel, it has been found that the effluent loses colour and all evil odours, to be accounted for by the resulting oxidation during filtering of the organic matter dissolved in the clarified sewage. Sewage thus filtered keeps for months without getting muddy or giving off an odour of any sort.

3. The application of aluminoferric is exceedingly simple. The material is supplied in solid cakes or slabs, each measuring about 22in. × 7in. × 6in., and weighing 56 lbs. each or thereabouts. These slabs are placed either in an iron cage or in a wooden box liberally perforated with half-inch holes (tapering

inwards), either in the channel or conduit leading to the settling tank or tanks, so as to admit of the water coming freely in contact with them. The aluminoferric, being entirely soluble in water, is gradually dissolved, fresh cakes being placed in the box as the old ones disappear.

With regard to the quantity of aluminoferric which may be required, this necessarily depends upon the degree of impurity present in the water. In some cases a ton will be sufficient to purify a million gallons. In other instances, where the water is highly impure, experience shows that it may be necessary to use a quantity equal to two tons per million gallons.

4. In the application of the Reeves system of sewage treatment to the particular case of slaughterhouses several novel and important features are introduced. The manholes, instead of being fitted with closed covers as above, are all fitted with open grating covers. By this means fresh atmospheric air is freely supplied to the drains, with the result that the gases from putrefying matters are oxidised as they are generated, and no foul-smelling air is allowed to form. But inasmuch as there are atmospheric conditions, frequently recurring, when atmospheric air will not enter by the gratings in sufficient volume to produce adequate oxidation of the organic gases, provision is made for oxidation being continuous otherwise. This is accomplished by means of the Reeves sewer ventilating apparatus, which automatically produces nascent oxygen and an oxidising watery mist which fill the manhole shaft and permeate the air in the drains. This apparatus can be regulated to any degree of strength, so that no foul smell can come from any of the drains under this system even during the hottest weather. Every manhole does not require to be fitted with an apparatus, but the selection of the manholes to be so fitted is a matter which it is better to refer to expert advice in each individual case.

The sewage may be treated in the drains by the Reeves system, so that it may be taken into the municipal sewers without causing practically any difficulty, and especially is this the case if the municipal sewers be also under the Reeves system of sewer ventilation. But if complete purification of the polluted waters must be effected before these leave the premises the following is the procedure that would, in a general way, be adopted.

Although the waters do not give off smell when under the Reeves process, yet, as they contain a large proportion of animal matter, they are charged with the elements of putrefaction in a large degree. Hence it is necessary if the best practical and economical results are to be obtained that a system of receiving and precipitation tanks be laid down. In these the sewage is mixed with the Reeves special chemicals, and precipitation of a large percentage of the suspended animal and other matters is effected. In many cases the purification thus obtained may be sufficient, but where a higher degree of purification is insisted upon the effluent from the precipitation tanks is again treated with a chemical oxygen carrier (also a Reeves speciality), and sprayed into the atmosphere when oxidation of any remaining impurities is completely performed.

The stages of purification by the Reeves system are well illustrated by the following analyses by Professor Wanklyn, the well-known expert.

The figure 140 indicates a very bad sewage, and it will be noted that it was reduced to 15 in the tank effluent and 0 in the final effluent.

Sample.	Gas per Gallon.		Parts per Million		Opinion.
	Nitrates.	Chlorine	Ammonia. Free.	Albumenoid.	
Raw sewage ...	—	—	140·0	5·5	Strong sewage.
Tank effluent ..	—	—	15·0	2·0	Moderately good effluent
Final effluent ..	9.3	6.5	0·0	0·5	An excellent effluent.

In this case the purification was effected without filtration, either through artificial beds or land, but as it is more expensive to produce a final effluent of such a high purification in this manner than with suitable land it is only recommended where land is not suitable, or scarce, or dear.

The sludge thrown down in the tanks by the Reeves process is without unpleasant smell, and contains valuable fertilising properties. It is therefore easily disposed of, and may be made in most cases a source of profit. This has been well illustrated in the case of the Reeves installation at Henley-on-Thames, where a field, which was described as a bed of sand and gravel 20ft. thick when the system was inaugurated there, has been yielding crops of

mangels, French beans, Brussels sprouts, etc., of the best quality, and which fetch the best prices in the market.

The basis of the Reeves system is oxidation, and its methods are all designed to effect the greatest oxidation at the least cost, having regard to local conditions. It is therefore in the highest degree a sanitary system throughout, the gases of putrefaction not being allowed to be formed. It is a natural system as far as such a term is applicable to sewage, because the sewage waste is utilised to the fullest practicable extent, and it is an economical system, because in avoiding nuisance the special difficulty of sewage disposal is reduced to a minimum.

5. The system employed by the Native Guano Company, generally known as the A.B.C. from the four materials—alumina, blood, charcoal, and clay—which form the substantial chemicals added to the sewage, but modified and lately perfected by the addition of small coke filters, is in the opinion of many leading sanitary authorities an ideal system of sewage treatment and disposal, and particularly adapted to abattoirs, since one of its essential component chemicals is a small quantity of blood.

The system in its original form was worked in several towns, notably Aylesbury, where it was successfully carried on for fourteen years.

It has now been worked for twelve years at Kingston-on-Thames, and the experiments there with filters following the tank treatment show that it is capable of producing :

(1) Perfect classification, no suspended matter being left in the effluent.

(2) Ninety-four per cent. of purification, which is the highest effected by any practical system (eighty-three per cent. is produced in the tanks alone).

(3) A sludge which when pressed and dried is sold in a regular market at £3 10s. per ton.

(4) The precipitants ensure complete deodorisation from the moment they are added to the sewage, and a recent examination of the works at Kingston by an expert has established the fact that the process in all its stages is conducted without any nuisance to the neighbourhood.

(5) The works are generally similar to those for most other systems where tank precipitation by chemicals is employed,

but particular attention is paid to the proper mixing of the chemicals, the carbon and clay, with the sewage by grinding them before solution in small mortar mills.

It is also necessary to have rather more presses than in the lime systems, since one of the essential features of this system, and one in which it differs from the "ferrozone polarite," is in avoiding the use of lime altogether, even to assist in the pressing. By this means the valuable manurial qualities of the sludge are preserved intact.

The price of works to carry out this system may be put at 10s. per head, and the subsidy charged by the company for doing the entire work and guaranteeing the result varies from 2s. per head for small populations to 1s. per head for those of 100,000 or more.

The system is peculiarly adapted to densely populated areas where land is expensive or unattainable, since the entire area upon which the Kingston sewage is treated, comprising works, tanks, and filter, is only four and half acres for a population of nearly 52,000.

On reaching the works, after screening, the sewage passes to the pump well under the main building, where it receives the blood, carbon, clay mixture, which deodorises and purifies it, effecting, it is asserted, in a few minutes as much transformation as acres of land in a sewage farm.

The sewage thus partially treated is raised about 12ft. by centrifugal pumps, of which there are three, each driven by a 15 h.p. engine, and capable of lifting 1,650 gallons per minute.

The pumps discharge into a meter chamber, whence the sewage is conducted along an open channel to the settling tanks. On the way it receives the salts of alumina, which act as the precipitating agent. The sewage thence flows in a continuous stream through the tanks, and passes through a culvert direct into the Thames. It is proposed if necessary to construct at a slight distance from the eight existing tanks about two acres of coke breeze filters.

It is calculated that this will be enough to accommodate not only the 1,700,000 gallons per diem, which is the average Kingston flow, but also the maximum of 3,000,000 gallons.

The sludge is pumped from the tanks into a sludge well by a Tangye-Holman double action pump, at the rate of five hundred gallons per minute.

From this well the sludge is first drawn into six accumulators by vacuum, and then forced by air-pressure at 100 lbs. to the square inch into filter presses on the first floor of the building, from which it is removed in hard cakes. There are three of Scott's air pumps and sixteen of the Native Guano Company's filter presses.

The pressed cakes are dried in a Borwick drying cylinder, ground into powder, bagged, and sold as Native Guano, at £3 10s. per ton. The Surbiton sewage is separately received and screened, and is pumped by centrifugal pumps into the Kingston pump well.

At present these works treat the sewage of—

Kingston, with a population of		...	...	34,277
Surbiton	,, ,,	...	...	12,735
Hampton Wick	,,	...	...	3,012
	Total ...	...	...	50,024

The purifying action of the ingredients, alum (salts of alumina), clay, carbon, and blood, employed in the A.B.C. process of precipitation was graphically described some years ago by Sir William Crookes, F.R.S., who showed, while each substance plays an individual role, the peculiar efficacy of the mixture results from the co-operation of their mechanical and chemical effects. The carbon acts chiefly as an absorbent, the blood as a coagulating medium, while the clay is principally effective as a mechanical weight to correct the levity of the hydrated alumina, as well as a nidus for the volatile manurial constituents which allows them to be slowly given up to plant life when the dried guano is applied to the soil. The order of events is also important. By adding the carbon, clay, and blood to the sewage as soon as it reaches the works it is rendered an inodorous emulsion in which the chemicals and sewage matters are thoroughly mixed and in a position to afford the maximum degree of separation and precipitation, when the sulphate of alumina is finally added.

That the action is a highly purifying one, quite apart from any final filtration, may be gathered from the results of the careful examination made by Prof. Dewar, F.R.S., and Dr. Tidy at Aylesbuy, when for a period of three months the Native Guano Company's works were placed at their disposal. In their report, amongst other conclusions, they stated that the process removes over

eighty per cent. of oxidisable organic matter, and further, that it precipitated sixty per cent. of the organic matter in solution. That the guano or dried sludge is highly popular, and that if the process were more generally adopted its more extended sale would still be assured in the market, may be gathered from the fact that during the four years ending 1900 the actual orders exceeded by seven per cent. the annual amount produced.

6. Degener's Humus method.—Dr. Degener, of Brunswick, uses turf and iron salt as a clarifying means. It is a well-known fact that repeated attempts have been made to cleanse manure-water by means of turf-filters, but until now no one has succeeded in obtaining a satisfactory result. Degener, on the contrary, does not propose to use the turf as a filter, but rather to add it to the manure-water in a finely broken up condition as a precipitant. The best material for this purpose is lignite (or black burning turf), which must previously be ground in a mill while *wet*, until it is very fine. But as the turf is not a good precipitant alone, 0·012 per cent. of iron salt must be added to the turf, that is, two ounces to every gallon of manure-water—a quantity which is really somewhat considerable if nothing else were used. Besides this, there must be one to two gallons of bruised peats to every gallon of manure-water, containing one to two pounds of dry peat ashes. This quantity of peat so increases the bulk of the sludge to be removed, that on this ground alone the method cannot be recommended, while further objection is raised by the fact that the chemical operations offer no advantages whatever.

7. According to A. and P. Buisine, sewage can be clarified by means of that very cheap chemical, ferric sulphide ($Fe_2 S_3$).

The efficiency of the latter consists in the fact that ferric hydroxide is formed by the alkali and earth-alkali salts contained in the sewage, which destroys the suspended fat and albumen, as well as the colour and smelling-matter, and converts the soluble sulphate into sulphate of iron. The precipitant soon forms a sediment which can be used as manure.

Quite lately a new preparation, by Dr. H. Nördlinger, has come into the market under the name of "Saprol." It is described as a disinfecting oil, and consists of fifty to sixty per cent. raw carbolic acid, with a fifteen to twenty per cent. addition of mineral oil (forty

to forty-five per cent. of creosote, thirty-five to forty per cent. of other tarry materials, and twenty per cent. of heavy hydrocarbon).

Experiments made with saprol prove it to be a capital deodoriser, which kills all bacteria, with the exception of anthrax-spores. It is recommended for slaughterhouse purposes on account of its many valuable properties.

Of the other methods of chemical precipitation in tanks, and the disposal of the sludge in the form of pressed cake, which have been alluded to, a great many have been tried, and for one reason or another abandoned.

The principal reasons for this are the liability of the tank effluent to secondary decomposition and putrefaction, and the difficulty of disposing of the resulting sludge.

Thus, Hillé's process was tried at Wimbledon and Tottenham, but has since been abandoned.

The Holden method was unfavourably reported on by the Rivers' Pollution Commission.

It was stated to be purely clarifying, and, so far from purifying, had a tendency to increase the putrescible matter in solution by converting some of the organic suspended solids into a liquid state.

The Anderson process, generally known as the Coventry process, was carried out for some time by the General Sewage and Manure Co. at Coventry, Nuneaton, etc., and is still used in more or less modified forms at several towns in the British Isles. It is spoken of very differently by various authorities, probably owing to the various proportions of the chemicals used in different localities.

The sludge is usually found to be unsaleable, partly owing to the preponderance of lime, and partly to the absence of any attempt to dry it from the stage of pressed cake into powder.

Variants of this process, together with iron sulphate or persulphate (Wardle's process), are also in use in some towns.

Where the amounts of the total chemicals employed reach one ton per million gallons, or about sixteen grains to the gallon, the purification effected is considerable. Where, on the other hand, as in the case of London, the dose is reduced to three grains of lime and one grain of iron sulphate per gallon, the title "chemical precipitation" becomes, as Dr. Clowes has recently admitted in his paper before the Society of Arts, December, 1900, a misnomer.

The Forbes and Price process, known as the phosphate of alumina process, was particularly designed to effect a purification of the effluent with the formation of a deposit rich in phosphates. Its main defect appears to have been the prohibitive cost of the precipitant (£4 10s. per ton).

General Scott's process (lime and clay alumina in the proportion ten grains lime, eleven grains clay, and two grains alumina per gallon) is in use at Ealing.

The sludge is converted into cement by being burnt in a kiln.

Hansen's process was tried at Wimbledon and Aldershot, but abandoned. It is at present used at Leyton and other towns in the valley of the Lea. The results are not remarkable as regards the effluent, and the sludge has no appreciable value.

The "Amines" process (Wollheim's patent, 1888) was designed chiefly to produce complete sterilisation of the effluent. It consists in the employment of from thirty to fifty grains of lime per gallon, and about three grains of herring brine, and derives its name from the trimethylamine which is found in brine. It is not now in use, having been found to be too expensive for the comparatively small results obtained.

The "Hermite" process, designed by M. Hermite, at l'Orient, is not so much a process for clarifying and purifying sewage as for sterilising the effluent. It consists of sea water charged with chlorine gas produced from its dissolved chlorides by electrolysis.

It has been employed as a terminal method at some towns, notably Maidenhead, but as the cost of working it there was no less than £500 a year, in addition to the ordinary cost of precipitation, it was discontinued on the ground of needless expense.

The *Webster Electrical Process* is an attempt to produce clarification and purification of sewage by means of electric action similar to what occurs in a battery. The chlorine and oxygen are liberated in a nascent condition at the positive pole, and the latter is supposed to effect an oxidation of the organic matters, and hence purification.

Whatever may be the theory, this process is spoken of favourably by such an authority as Santo Crimp, and has been tried at Salford, where it produced less sludge and better purification than any of the lime or lime and alumina processes, or the International Co. using the ferrozone and polarite.

At the same time it has never got beyond the experimental stage,

and is not in use at any town in Great Britain at the present moment.

BACTERIAL SYSTEM OF SEWAGE TREATMENT.

In the bacteriological cleansing method of Scott-Moncrieff the sewage is led outwards over a filter bed consisting of gravel and coke, and allowed enough air to favour the growth of aerobic micro-organisms, which, when they exist in sufficient quantity, effect a rapid oxidation of the organic matter, so that a non-injurious effluent is obtained. A filter which takes up very little space can be used for five months uninterruptedly. An old filter full of microbes works better than a new one. New filter beds can be inoculated with material out of a filter which has already been in use for some time.

Scott-Moncrieff's theories certainly appear very fascinating at the first glance, but it cannot be asserted that satisfactory results can be produced by them. In spite even of the immense activity of the microbes, it is yet impossible in the short time that the sewage takes to run through the filter to guarantee more than a superficial cleansing.

The principles which lie at the base of Scott-Moncrieff's system of the purification and disposal of sewage by bacteria have since been amplified, and led to the development of many varieties of bacterial treatment which differ from each other, first in regard to the prominence they severally give to the different stages of chemical change believed to be due to the action of specific and successive groups of bacterial growth, and secondly in minor details.

The two principal stages of sewage decomposition attributed to bacterial action are:

(1) Anaerobic liquefaction.

(2) Aerobic purification by oxidation, and the formation of stable innocuous nitrates, etc.

The first of these is accentuated in Scott-Moncrieff's cultivation bed, and in the septic tank of the Septic Tank Syndicate, originally started at Exeter.

The second is accentuated in the aerobic contact beds of Dibdin, and in the continuous filters of Whitaker, Stoddart Wallis, etc. A proper proportion of each produces the best results.

The various systems are as follow:

The Septic Tank and Coke Contact Filter Bed.—This system

admits the sewage after deposition of detritus into a tank, which is constructed to hold a twenty-four hours' supply. No chemicals are added, but the natural processes of decomposition are left to work the necessary changes. The effluent from the tank is run on to a series of contact beds, *i.e.*, filter beds worked on the principle of resting full and empty in order to facilitate the operation of the anaerobic and aerobic bacteria respectively.

The filters are usually 3ft. in depth, and are either made of clinkers, coke, or ash of various sizes, and of such an area that one million gallons can be accommodated on about two acres in the twenty-four hours.

They are worked in cycles of either four or eight hours, the period of resting full being from one to two hours. There is an automatic arrangement by which the tank effluent can be distributed on to the various sections of filter, but in practice this is found to be expensive and liable to derangement.

It was expected by its more enthusiastic supporters that the septic tank would remove all sludge by the resolution of the solids in suspension in the sewage into gas and liquid, leaving a clear effluent to be dealt with on the filters.

As a matter of fact, the recent extensive experiments at Leeds, Leicester, Manchester, and Exeter have shown that these desirable features are only partially accomplished.

On an average about two-fifths only of the solids are dissolved in the tank, nearly two-fifths are deposited in the tank, and over one-fifth is left to go on to the filters and clog them up. These are both serious drawbacks, since the sludge in a septic tank is peculiarly offensive and difficult to press or dispose of. Besides, in the septic installations at present designed no provision has hitherto been made for dealing with septic tank sludge on a practical scale. The sludging up of the filter beds is found to occur at the rate of about 0·8 per cent. per week, or forty-one per cent. per annum. This means that about every two years the material of the filter bed has to be taken out and renewed.

The purification of the septic tank is not much more than fifty per cent. from the crude sewage. Consequently the bulk of the purification is thrown on to the filters.

The highest purification effected was that at Leeds, viz., eighty-six per cent. This is only three per cent. more than in the tank by

chemical precipitation at Kingston, and eight per cent. less than by the single filtration of the Kingston tank effluent.

The general impression from the results of the septic tank and filter experiments so far is that while the system may be advantageous on a very small scale and for private establishments, the drawbacks above mentioned render it quite as expensive and more cumbrous than the chemical precipitation and filtration on a large scale.

The system has only been used for the whole of the sewage of one town at present, viz., Barrhead, in Scotland, where the river conservancy is practically non-existent.

The Dibdin system, called after its founder, was proposed with the view of doing away altogether with tanks as a preliminary and trusting to a succession of filters to dispose of the sludge as well as to purify the effluent.

The raw sewage was first conducted to a coarse filter made up of large sized coke or clinker, and the effluent from this was treated on a fine filter made-up of much smaller material, usually coke, ash, or coal.

Since the first coarse filter took the place of the septic tank and acted in much the same way, the result may be inferred. The sludge which is deposited in the septic tank, and can be thence removed, is dispersed throughout the coarse filter, which in consequence rapidly chokes up. The average rate of choking is found to be about two per cent. per week with crude and one per cent. with settled sewage.

The result has been to show the necessity for preliminary tank treatment, either chemical or septic, before allowing the sewage to flow on to the filters. Otherwise the choking is prohibitive.

It may therefore be considered to have been little more than a wild attempt to see if filters alone could purify crude sewage and to have proved their capacity to do so practically.

CONTINUOUS FILTERS.

These are the most recent development of the filter principle worked on bacterial lines, and involve a continuous passage of sewage or effluent in contrast with the contact beds in which there are definite periods of rest and flow.

They are designed chiefly with the view of ensuring the most rapid aëration and promoting the activities of aerobic bacteria after previous anaerobic decomposition in the tanks, though unsuccessful attempts have been made to make them filter crude sewage without previous tank treatment.

Of these the Ducat filter at Hendon, Stoddart Wallis's dripping filter at Bristol, and Whitaker Bryant's, with a rotating sprinkler, at Accrington, are the most prominent.

The Ducat filter is a direct outcome of Scott-Moncrieff's principle. The chief feature of it is its great depth, about ten feet, the introduction of air into every part through the pipes of which its sides are built, and the necessity for having it warmed in cold weather to prevent consolidation.

It is said to produce good purification, but its expense and complexity are drawbacks to its adoption. It is in use at Hendon, Middlesex.

The Stoddart-Wallis filter, called after its inventor, is composed of large pieces of clinker, three inches to four inches in diameter, arranged in the form of truncated pyramid with out supporting walls, upon which the effluent from a precipitating or septic tank is allowed to drip from a corrugated iron tray pierced at frequent intervals with small holes. The continuous aeration thus produced effects considerable purification, but unless the tank effluent has very little suspended matter (a septic tank effluent usually has from ten to thirteen grains per gallon), a dilemma ensues. Either the solids must be arrested by making the filter of fine materials, in which case choking of the filter ensues, which ultimately necessitates cleaning and renewal of material, or else the solids eventually come through the filter, and have to be removed by deposition in terminal tanks, thus doubling the tank requirements.

Experiments with this filter are being conducted at Bristol and Knowle.

The Whitaker-Bryant filter is similar to the Stoddart-Wallis in general construction, but is fed by a rotating sprinkler, actuated automatically by the flow of tank effluent through it.

It is being experimentally worked at Accrington in Lancashire.

ELECTRICAL CLEANSING.

Finally, there remains to be mentioned the process of cleansing sewage by means of electricity, and it appears really possible to bring sewage to a high degree of purity and cleanliness, both chemically and bacteriologically in this way. But the experiments made up to the present time show that no one has been successful as yet in effecting in any way a more thorough cleansing by this means than with the help of cleansing material. Besides, electric cleansing is as yet so costly that on this ground alone its use cannot be recommended.

The oldest of these methods is Webster's, which consists in having the dirty water electrolysed by means of iron electrodes in a series of receptacles communicating with each other. The principal feature of this method is the iron which is oxidised by the electrolysis. A sediment is thus produced which sinks to the bottom, taking with it organic and other substances, and so clearing the water. There immediately results a decomposition of the chlorides contained in the sewage which must first be added (chloride of sodium, chloride of magnesia, chloride of ammonia), whereby the chloride is separated to the positive and the metal to the negative poles. According to the latest experiments, "hydrogen" is given off by this process if chloride of sodium be the salt used as well as chloride of iron, which is immediately converted with the sodium hydrate into ferric protoxide-hydrate and chloride of sodium; the ferric protoxide-hydrate works somewhat better on account of its fine division, but is not otherwise different in principle from the ferric protoxide-hydrate which is formed by the mixture of the sewage with sulphate of iron and lime. The Webster method is no other than a chemical cleansing process, and only has the advantage that the fluid remains neutral and not alkaline.

The Hermite method electrolyses water containing chloride by means of a specially-constructed disintegrating apparatus, which produces the chloride and then uses the water containing chloride for the disinfection of the impure water. The special characteristics of this method are the disintegrating apparatus and Hermite's proposal to use sea water—the contents of which are so rich in chlorides—for the purpose of disinfection.

Other methods are those of Jewell, Phillips, Newton, Meritens, Fewson, and Capron, which have not as yet shown satisfactory results, and are, besides, all very costly.

The Value of Manure.—The waste from the slaughterhouses and cattle-yards consists of refuse of various kinds, part of which can be used as manure in its existing form, but some must undergo a special process before it is suitable for this purpose. Of the latter kind are the various parts of the carcase which are thrown away, the contents of the bowels, hairs, bristles, claws, etc. The former includes the animal excrement and the contents of stomach and bowels. As a rule, these find immediate use as manure. In all the larger towns there should be a strict separation of the refuse from the slaughterhouse and the cattle-yard, and *in all circumstances any removal of such matter should be prohibited until it has been passed as free from all infectious germs.* The spreading of animal epidemics through these manures can be effectually prevented by this means.

"The manure obtained from the contents of the stomach and bowels is heavily charged with water, and very poor in easily soluble ammonia nitrogen. In many slaughterhouses this manure is placed in a pit, with a drain at the lowest part, through which the valueless liquid flows off during storage. In towns with a system of drainage (Berlin, for example), it is usual to connect this outlet with the sewers, which is the simplest and most convenient method. Against this nothing can be said, if care is taken that the municipal sewage is thoroughly treated, otherwise, as has been already mentioned, this drainage must be made harmless either by clarifying or filtering, or both together, before being led into the sewers.

"The mucus of the bowels is of great value as manure, and in the Berlin slaughterhouse it is first boiled for a long time by steam, and then made germ free. Its bulk is thus diminished by the evaporation of eighty to eighty-five per cent. of the water.

"The dung from the animals in the slaughterhouse is of similar composition to common stable manure, if the same quantity of litter has been used, and if it is collected and kept with the same care. As a rule, this is not done ; for instance, the water is often allowed to flow off to unite with the other sewage. The solid constituents remaining behind are mostly of less value, and it is usual to place them along with the contents of the stomach and the bowels in common storage.

"In the cattle-yards of the larger towns especially it is common for a considerable quantity of stable-manure to be obtained, which is mostly worth about as much as that from the slaughterhouse, for

the same reasons as that given in the above paragraph. This manure also is often of a poorer quality than farm manure, because it does not contain a sufficient quantity of fluid.*

"In Berlin this manure is injudiciously mixed with that of the slaughterhouse. The cattle-yard and slaughterhouse manure should be retained in the immediate neighbourhood of its origin, because the spreading of infectious germs can then be avoided. But in no case should the refuse of the slaughterhouse be sent over to the cattle-yard—a practice which is, unfortunately, carried on in some places. If, on grounds of economy, a common storage and mixing is adopted in small and medium-sized towns, it should be done in a third place quite shut off from both slaughterhouse and cattle-yard, although in the neighbourhood of both."—Vogel.

Without regarding small slaughterhouse, on which the erection of a special building for the preparation of manure would not pay, and where it is quite possible to make it germ-free by *thoroughly embedding* it in milk of lime, Vogel recommends that all the refuse should be poudretted. Poudretting consists in adding to it two to three per cent. of sulphuric acid, and then heating it to 212°F. by means of steam. This will result in the thorough extinction of the countless numbers of microbes contained in the refuse, and at the same time the manure which contains a large quantity of water will be converted into proportionately valuable, dry, powdery, and therefore easily scattered manure, which, although it is never equal to the manure prepared from human excreta, is, nevertheless, of such value that it is worth sending to great distances. Dr. Vogel made the following experiment to prove the effectiveness of this method:

"A sample of fresh refuse from the common collecting-pit of the Berlin slaughterhouse and cattle-yard (taken in September, 1895) was examined as to the germs contained in it, and then treated with two per cent. of sulphuric acid diluted with ninety-six per cent. of water. After standing for half-an-hour a part of this was tested while the other part dried at a heat of 212° to 221° F., and after being thoroughly dried was also tested. It contained:

*Boysen recommends that in every place where animals are kept for any considerable period (up to ten days), *peat-moss* should be used (six pounds to each animal), and rye-straw as well. An admirable manure is thus obtained, the entire fluid manure is retained, and the valuable material is practically protected against loss. Thus the stalls are kept dry.

In 15 grains of the fresh manure	...	12,600,000	germs.
In 15 ,, of that treated with acid, but not steamed	...	750,000	,,
In 15 ,, of that treated with acid, and also steamed	...	no germs.	

"In the test which had been subjected to acid treatment alone, all the vegetable forms were killed and only the spores left; but by the steaming process these were also destroyed."

Poudretting is therefore highly recommended for reasons which are evident, and should in no case be neglected from a financial view of the question. In large towns scarcely any sacrifice of money is necessary, as these institutions may be connected with others of a similar nature; under favourable circumstances, indeed, a considerable profit may be gained by their use.

In any case experiments have proved that by the mixing of slaughterhouse and cattle-yard refuse with lime a thorough extinction of the germs contained in such refuse is not possible, so that such a method cannot be recommended, even if the lime is added in such quantities that ignition results and combustion of this refuse takes place.

Further, Vogel shows that slaughterhouse and cattle-yard refuse may be used exactly as stable manure is, "provided that it is borne in mind that it is of comparatively little value for the nourishment of plants, and that double the quantity must be used as compared with stable manure to attain the same result. But as the use of this refuse is attended with great danger to other animals, it must not be employed in its raw state, and should not command such a high price as it does at the moment in Berlin. Even when poudretted double the quantity must be used to that of ordinary stable manure."

It will be interesting to note the amounts obtained annually by various towns for the slaughterhouse manure as ascertained from inquiries made by Dr. Vogel in 1894. In making calculations as to the actual profit, the expenditure on litter had to be borne in mind.

The result of a glance over the statements made by 231 slaughterhouses shows that, on an average, there is about $2\frac{1}{2}$ cubic feet of manure from every single large beast, for which about 3d. is obtained, and it may be reckoned that half of this is net profit.

CHAPTER IX.

FRONTIER SLAUGHTERHOUSES AND QUARANTINE ESTABLISHMENTS.

THE IMPORTANCE OF THE FRONTIER SLAUGHTERHOUSES.

In addition to the advantages which public slaughterhouses already offer, there are still two important factors associated with frontier slaughterhouses; the prevention of the spreading of contagious epidemics across the boundary line, and the providing of frontier countries with cheap and sound meat. The latter point is of great importance on the Silesian boundary, as the production of cattle is there not nearly equal to the requirements of the thinly populated district. Next to the hygienic comes the economic importance, as besides the frontier districts, the countries in the interior may also be supplied with cheap meat.

In any case, frontier slaughterhouses offer more security in a sanitary respect than the quarantine stations erected on the Austrian frontier (Bielitz, Biala, Steinbruch, etc.), in which the pigs are first examined by a veterinary surgeon for a stated time before passing the boundary, so that they may reach the place of their destination direct without unloading. Besides considerable expense thus incurred by the owner and the loss of weight, there is another danger,* the infection of an epidemic being transmitted to a whole

*The danger of these quarantine stations is so much the greater when the whole building is badly constructed, and it is common knowledge that Steinbruch, for instance, has scarcely half the quantity of water required for general purposes, while there is no system of drainage in existence. This almost incredible state of affairs can be understood by a glance at the development of the institution. We must go back to the year 1847 to find its origin, when the first primitive wooden stabling was erected. After that, small sheds were added annually, and in the year 1869 a limited company was formed, which took over all the buildings, and then enlarged them by degrees, so that now the buildings cover an immense area. But it has never occurred to the company to take down the old buildings, and these old wooden buildings have been allowed to stand, whenever they were not perfect ruins, beside the newer stalls, and there has never been any addition to the waterworks to correspond with the greater requirements. This want was covered by abandoning all regular cleaning of the place that cannot absolutely be done without. The whole drainage system is simply this: from some of the larger stalls drain-pipes have been laid, but their contents are taken to a cess-pit, into which the entire refuse of the place is emptied. So that, apparently, the whole of the manure, etc., from the thirteen million pigs which have passed through this place since 1871 is for the greater part underneath the Steinbruch establishment, or in its environment! Thus, an epidemic was caused which, notwithstanding the complete rebuilding up of the establishment, may still be a source of great danger.

consignment. The dangers and difficulties which present themselves to the traders in these districts are inducements to smuggling; for, according to calculations made by Traeniski, in spite of exercising the strictest supervision possible on the Austrian frontier, eight thousand to ten thousand pigs found their way into Germany annually until some years ago.

The frontier slaughterhouses help to remedy this evil, and for several years there have been a number of these establishments on the frontiers between Russia and Austria (Bentheim, Kattowitz, Myslowitz, Tarnowitz, etc.), in which animals from neighbouring states are detained for a short time for the purpose of inspection before being killed for consumption in any desired way.

SITUATION OF FRONTIER SLAUGHTERHOUSES.

The requirements in connection with public slaughterhouses must be complied with, still more particularly, if possible, in frontier establishments. The cattle-sheds ought not to be very large, or should be provided with closed partitions, so that after the different kinds of affected animals have been separated, they can be easily and thoroughly disinfected in case of an outbreak of epidemic disease, without necessitating an isolation of the rest.

Especial stress must be laid on the situation selected for the offal-house, the manure-house, and the sewage-purifying house, so that the spread of the microbes, and a consequent epidemic, are not caused by the sewage, which must be chemically purified. Suitable arrangements must also exist either for removal or disinfection of diseased parts without possibility of contaminating anything else, because the real object of the frontier slaughterhouse is that all that could contribute to the spreading of an epidemic, on either side of the boundary, should be kept back in the slaughterhouse, and thus be prevented spreading to the other.

In order that the meat can be put to a suitable and advantageous use at any time, precautions must be taken for its careful preservation by means of a cold store, which is absolutely necessary for the purposes of supplying the interior with good and cheap meat.

Sea Quarantine Stations.—As the frontier slaughterhouses are a protection on land against the spreading of contagious epidemics from neighbouring countries, the port quarantine stations do the same for imports from over sea, with the further security, however,

that smuggling on the coast becomes extremely difficult, if not impossible.

Under par. 6 of the Epidemic Law of 23rd June, 1880, and 1st May, 1894, a ten days' quarantine was ordered for Danish and Swedish cattle, by a decree of 27th June, 1895.

On the 11th July, 1895, the Chancellor of the Empire promulgated the regulations for carrying this into effect as follows :

"The stations must be situated in as close proximity as possible to the landing-places set aside for foreign cattle. If the establishment is not close up to the landing-stage, transportation must only take place by means of railway waggons. Sufficient precautions must be taken that inland cattle do not set foot on the landing-stages, their surroundings, the road leading from them to the quarantine station, or even in the neighbourhood of these establishments.

"The quarantine establishments must be fenced in, and each supplied with its own well, or with a water supply.

"The stables must be fitted up for the reception and maintenance of the animals to be put into them, and must allow of the separate stabling of each cargo, and must be so built and fitted up that the latter and all its fixtures can be thoroughly disinfected. If the quarantine establishments are not provided with slaughtering-places of their own, they must be connected by rail with the slaughterhouse of the seaport they are in, the railway being a separate line for this purpose alone, and with special waggons.

"In those establishments which neither have slaughtering-places of their own, nor are connected with the slaughterhouse by a line of rail, closed waggons must be used for the carriage of the cattle to the slaughterhouse; these must not permit of anything falling out of them during transit.

"The slaughterhouse must be so constructed that the quarantine cattle can be kept apart from the other beasts until they are killed.

"Neither manure nor rubbish must be removed from the quarantine establishments until it has been thoroughly disinfected, under the inspection of the police."

Since the regulations of February, 1897, every animal brought into the quarantine establishments must be marked with a number, and also with a letter designating which quarantine it has passed through : K—Kiel, A—Altona, T—Tonning, etc. All the animals

are to be inoculated with "tuberculine." Wherever there is a reaction, the animal is to be killed on the spot or sent back to where it came from.

Massive buildings have been erected in Kiel for quarantine purposes, at a cost of about £12,500. This large sum has been expended, so that it may eventually serve as a cattle-yard for home and foreign beasts when quarantine is raised; it has, in fact, been already extended for this purpose.

The establishment at present has space for 750 cattle and about 400 pigs, divided into compartments to each contain twenty-five to thirty animals, or, if two cattle-stalls are changed into pigsties, there is room for 600 cattle and 1,200 pigs. All the buildings are of iron, stone, and cement. There are stables 160ft. long and 25ft. wide. The walls are of cement, the ceiling has a laying of insulated material, while the under-side of the concrete arches is plastered $\frac{3}{4}$in. thick. The floor consists of concrete laid with clear yellow Dutch tiles. Drainage, water pipes, and ventilation have all been fitted up carefully. Besides the stables, there are rooms for the slaughterhouse manager, the veterinary officer of the district, and the overseer, also a disinfecting-room for other persons admitted, a harness-room, a milk sterilising room, workers' rooms, and stores for keeping straw and fodder. All these rooms, along with an inspection stall, are in a separate building from the stalls, although they face them, with a 6ft. 6in. passage between.

CHAPTER X.

MANAGEMENT AND STAFF.

(*a.*) *State Supervision.*—The buildings and arrangements of a public slaughterhouse are, like every other industrial concern, controlled by inspectors appointed by the State. The veterinary officers of the different districts are also obliged to make regular reports, according to par. 17 of the law concerning the prevention and suppression of disease amongst animals (of 23rd June, 1880, and 1st May, 1894), the number and range of which are settled by the authorities of the district.

Par. 17 of the law runs as follows:

"All *cattle* and *horse markets*, also *public slaughterhouses*, shall be inspected by *veterinary officials*. This regulation can also be extended to the pens erected by dealers for the accommodation of animals brought together for public sale, either on public or private premises, to those beasts offered to the public for breeding purposes, to all public cattle shows, and to all other animal stock brought together and not included in any of the above classes, also those in hotels, inns, private slaughterhouses, and the stables of cattle dealers. The veterinary officer is obliged to at once bring to the knowledge of the police magistrates all cases of infectious disease, or any appearance of such, amongst the horses or cattle mentioned above or on the market, and, after examination of the case, to set in motion the necessary police regulations. If there is danger in delay, the veterinary officer must arrange for the immediate isolation and watching of the diseased and suspected animals, even before the interference of the police."

In an order issued on the 21st July, 1895, to all Government Presidents by the Minister for Farms, Domains, and Forests, the following appears:

"In par. 17 of the Act of 1st May, 1894, it is ordered that *public slaughterhouses* shall also be inspected by official veterinary

surgeons. I take it for granted that the necessary regulations have already been complied with, and only observe, in consequence of a recent application for information, that the costs of this inspection shall be met by the salesmen in accordance with par. 7 of the Prussian law of 18th June, 1894, referring to par. 24 of the Prussian law of 12th March, 1881,* and shall be settled by you in default of the interested parties not coming to an amicable agreement.

"In the weekly markets, to which cattle are regularly or frequently driven for sale, also hotel stables, private slaughterhouses, and the stables of cattle dealers subject to inspection by medical officers, the regulations are to be left to your discretion in accordance with par. 7 of the Prussian law of 12th March, 1881, and therefore I confine myself to recommending you on the appearance of very contagious cattle diseases to immediately enforce the police regulations for their suppression. As to the costs of veterinary inspection of this kind, the above cited legal regulations hold good."

As to how far these reports on public slaughterhouses under veterinary control are applied, or are of use generally, need not be discussed here, but Fischöder is undoubtedly justified in saying that "the negative position maintained for the most part by municipal authorities against any innovations in this line of business shows that improvements can only be obtained by pressure on the part of the District Committee."

In fact, many abuses can be remedied in this way, especially in small slaughterhouses, and therefore we find the following in a special order issued by the President of Bromberg (1895) to the County Councils: "With regard to the different conditions of individual slaughterhouses, definite proposals on the intended number of inspections† should be made for every individual slaughterhouse," which is as much as to say that well-arranged and

*The costs which arise out of the inspection carried out by official veterinary surgeons in cattle and horse markets, and also amongst all live stock brought together into one place, and amongst male breeding animals (par. 17 of old law and 7 of present law), fall on the salesman, and, in cases where no amicable agreement is arrived at, must be settled by the local chairman of district committees. Should there be several parties connected with the same undertaking these are considered conjointly liable.

†According to a resolution of the District Committee at Königsberg (June, 1898), the Chief of Police is empowered to allow the Imperial District Veterinary Surgeon to practise sanitary police control in the municipal slaughterhouse *at any time*; because the slaughterhouse is to be regarded as a public place, and the police authorities are bound to look after the order, safety and health of the citizens.

well-managed institutions do not require as much examination and inspection as those less perfect.

In some districts the inspections are not made by the local veterinary officer, but by the officer of the *department*, in others they are made regularly every quarter by the former, and *once every year* by the latter, with consequent increased expenses to the community. As regards the latter, Fischöder says very justly "that it would be more advantageous to the interests and the authority of the veterinary officers if the control of the slaughterhouses were assigned *to the veterinary surgeons of departments* instead of the *district officers*, and it is to be regretted that motives of economy alone prevent this arrangement being carried into effect."

In any case the officials authorised to make these inspections are commanded to acquaint themselves with the practical arrangements of slaughterhouses before they criticise the institutions under their control. Unfortunately, this does not always happen to be the case.

Instead of the annual inspection being undertaken by the departmental veterinary surgeon, it might perhaps be better if done by a *specially instructed Government official*, as Inspector of Slaughterhouses. The latter must, of course, make himself thoroughly acquainted with all the details of such an institution.

The expenses incurred for these visits of inspection are to be borne by the committees who possess slaughterhouses or cattle-yards, according to par. 24 of the Prussian law of 12th March, 1881, and of the Order of 12th July, 1894, and in this manner. A certain sum—for instance, one or one and a half per cent. of the annual income—is to be set aside in the balance-sheet as a Government tax, and the amount is to be sent direct to the Ministry at the beginning of every year, along with a copy of the balance-sheet, and out of this income the salaries of the inspectors are to be paid.

It is of great advantage to the manager of a slaughterhouse if these visits of inspection are made by a competent official, for he can thus be made acquainted with many valuable improvements, and he will have more chance of getting these or other long needed alterations carried out when pressure "from a higher quarter is exercised upon the community."

It is possible that the same pressure could be brought to bear on corporations by district and departmental veterinary sugeons; but as the visits of such officials would only be within a small and

limited area, they are not so well placed for learning the progress made in other districts.

(*b*) *The Slaughterhouse Committee.*—The management of the slaughterhouse, in a wider sense, lies in the hands of the magistrates, under whose orders a slaughterhouse committee is formed, selected either from the magistrates themselves, from the municipal corporation, or from the latter and from those burghers who are entitled to vote (par. 59 of the Municipal Orders). We refer here principally to communal slaughterhouses. For this committee it will be judicious to choose those who have already taken an active part in the erection of the slaughterhouse, taking every care, however, that anyone with a *personal interest* is *absolutely excluded* from serving on the committee.

It goes without saying that the manager should be on the committee, but generally he is only admitted as an advisory member. It would be better if municipal authorities followed the recent suggestions of the Government, and allowed the manager to be an active member on the same footing as the others.

The duties incumbent upon the committee and the various officials are defined in special regulations, a copy of which is to be found at the end of this chapter.

The Manager and his Duties.—In any case the management of a slaughterhouse devolves upon the *manager* in the narrowest sense; he is the actual guiding official, and his chief business, which, except in very large establishments, is the examination of animals as to the condition of their health, makes it necessary that his being a *well-approved veterinary surgeon* is the principal requirement for his appointment. For par. 2 of the law of 18th March, 1868, and 9th March, 1881, stipulates that "all animals destined to be killed in the slaughterhouse must be subjected to an examination by an 'expert,' both before and after slaughter, to determine the condition of their health." A decree of the President of Bromberg (September, 1891) more clearly explains the position by stating that a slaughterhouse inspector, according to the law of 18th March, 1868, and 9th March, 1881, must be an *approved veterinary surgeon*, and that if, in small slaughterhouses, it is advisable on economical grounds to appoint a man who is not a veterinary surgeon, he must previously have gone through a course of training in a slaughterhouse conducted under the superintendence of a veterinary officer, and have

been thoroughly examined by a departmental veterinary surgeon as to his fitness for the position.

Decrees having the same purport were issued by the President of Posen on 11th January, 1892, and on 18th May, 1896. The latter runs as follows :

"Regarding the cost of upkeep, I must still remark that a number of towns have appointed as their head slaughterhouse official, not an approved veterinary surgeon, but a person who has perhaps acquired the knowledge necessary for the position by having taken a three weeks' practical course of lessons in a slaughterhouse under veterinary superintendence, and who has afterwards been examined by the district veterinary officer. Thus, a great saving is effected if a trustworthy person is chosen.

"Although, as a general rule, it is well to have a public slaughterhouse put under the direct guidance of an approved veterinary surgeon—and in any case the oversight of such an establishment should be entrusted to the care of a scientifically-instructed individual—still it might be *allowable* that in those places in which *no* district veterinary surgeon or other approved veterinary man *lives* the superintendence and oversight of the public slaughterhouse be entrusted, not to an approved veterinary surgeon, but to a person sufficiently educated in other ways, *provided permission be given.*"

The President of Gumbinnen also emphasises in his decree of 11th August, 1896, that only in exceptional cases would he grant his permission to a person without full veterinary acquirements acting as expert in a slaughterhouse.

"For," the decree says, "the increased expenses entailed by the appointment of an approved veterinary officer as slaughterhouse manager can be covered without difficulty by the killing dues and by *restrictions as to the time for killing*. By limiting the latter in small places in summer perhaps to between six to nine in the morning and four to eight in the afternoon, and in winter from seven to ten in the morning and three to seven in the afternoon, an important saving in fuel is effected. A limit to the killing times also allows the veterinary surgeon, who has been appointed slaughterhouse director, some time for private practice, so that it is not necessary to give him a very high salary. A limitation of the killing time also makes it possible for the district veterinary surgeon to visit the slaughterhouses of such towns in which no suitable

private veterinary surgeons exist, and in which, therefore, he is himself obliged to examine all slaughtered animals."

In 1888 the Government at Breslau refused to sanction the slaughterhouse regulation of the town of Striegau, because of the proposed appointment there of a *butcher* as slaughterhouse *overseer*, as this office, being connected with the expert examination of animals for slaughter, was a function which could only be exercised by an approved veterinary surgeon.

The President of Posen also refused permission to the town of Ostrowo to appoint a slaughterhouse manager, because he was not duly qualified in veterinary practice.

The choice of a managing superintendent is of great importance for the prosperity of the establishment, for he must unite within himself many different capabilities and characteristics. Besides having a thorough knowledge of the art of meat inspection, he must have a certain general, practical, and mercantile aptitude, as in small establishments he will also have oversight of the office business, and in any case he ought to have such practical knowledge of, or at least sufficient to understand, the engineering work and plant as to be conversant with all the occurrences that might happen and be able to present a report to the magistrates.

But it is going too far to require of him a *special* knowledge of engineering "so that he can immediately repair damages, and thus have a special hold over the workmen." If the director finds he cannot depend on the engineer appointed, it is better for him to take the help and advice of a thoroughly technical, independent man for the *case in question*, as he may very easily do some injury himself for which he would be answerable. Undoubtedly, however, inconveniences will easily arise, if in small and medium-sized businesses another technical official in the employment of the corporation (for instance, the director of the gasworks) were to undertake the perpetual oversight and control of the building and the engineering arrangements of the slaughterhouse.

In large institutions there is usually a special expert who supervises the buildings and looks after the repairs.

As already mentioned in Chapter V., it is very judicious to appoint the head official as soon as possible when erecting a new establishment, so that he may as early learn exactly what all the arrangements are to be, and perhaps prevent mistakes by his advice.

Training.—To those characteristics must further be added energy, rectitude, and tact. Tact, especially, is a quality which must not be lacking in an official occupying this position, for he is perpetually dealing with a special class of tradespeople, whose characteristics will be discussed later on.

Perhaps the butchers are of opinion that the slaughterhouse is, *in the first place*, a common working centre for their trade, and that the officials appointed to it are there *on their account*. It does not occur to them that slaughterhouses are erected *as a first consideration for hygienic reasons*, and we believe that it is in consequence of their mistaken opinion that the slaughterhouse officials, especially the veterinary experts, do not meet with the respect which is due to their position and training, and which they have a right to demand.

Often such conduct on the part of the butchers has its origin in the fact that the expert in question not only has not a proper knowledge of his profession, but also because in the exercise of his calling he has made mistakes which render his position precarious.

In choosing a superintendent for a large slaughterhouse it is advisable to have someone who has already had practical experience in managing such an establishment; but for small slaughterhouses it would be sufficient if the candidate had only had experience in the inspection of meat gained in a larger place. As more knowledge and experience in this special department are required than are usually expected of the veterinary surgeon pure and simple, differences between expert and tradesmen are more likely to be avoided; in fact, complaints have often been made by butchers that experts have been appointed without sufficient knowledge of meat inspection, and not without reason.

Until of late the training of the sanitary veterinary officer has been most incomplete; but some years ago a special chair was founded at the Veterinary High Schools for this subject, and the training on meat inspection is now thorough. Meat inspection is now the test subject in the examinations for the appointment of veterinary officer in Prussia, Würtemburg, Saxony, and Hesse; in Würtemburg *before* being allowed to pass this examination the candidate must have gone through a two months' course of training in a large slaughterhouse under veterinary management.

On many sides it has been suggested that a petition should be sent to the Ministers of State, asking that the appointment of

slaughterhouse veterinary officer (with the title "Sanitary Veterinary Officer") or slaughterhouse manager should only be made subject to a special examination, previous to which the candidate must have undergone a course of training, of at least a year's duration, in a modern slaughterhouse under veterinary guidance.

The value of such a special examination is evident, and can undoubtedly be thoroughly justified. It is doubtful, however, whether this should be deemed sufficient, without in addition requiring personal testimony as to the capabilities of a candidate, as in the present custom of some corporations when making the appointment of slaughterhouse manager; for the police functions of a district veterinary officer are always exercised in the slaughterhouse and in the cattle-yard only by *imperial* and not by *municipal* officials, there being no difference whether the latter possesses the qualifications for the appointment of an official veterinary surgeon or not. Thus, according to par. 2 of the law of 23rd June, 1880, and 1st March, 1894, and par. 24 of the law of 12th March, 1881, and 18th June, 1894, another veterinary surgeon can be called in, in place of the local officer, in the event of the latter being ill or absent for any pressing reason. The preamble of the law states as follows:

"A veterinary surgeon, for example, who is appointed by a corporation or a private party may, in the exercise of State functions, easily come into conflict with those who appointed him, and appears therefore *unsuited* to fulfil the duties of a veterinary official."

For this reason only the veterinary officers appointed by the State can examine the animals in cases of epidemic already in existence, while the examination of the animals attacked with other diseases, and those that are unsound and in poor condition, should be left to the Corporation veterinary official.

If a veterinary surgeon in the position of managing official be expected to possess the information and capability of an imperial official, we might just as reasonably expect the managing officials of a hospital or a lunatic asylum to have the knowledge of the head physician, which is, however, far from being the case.

In the kingdom of Saxony and in the South German States this point is uniformly settled by arranging that the manager of every large cattle-yard and slaughterhouse shall be at the same time a *district veterinary surgeon*, who has to exercise the functions of a district officer in that institution.

As to whether the departmental or district veterinary officer is permitted the free entry into the slaughterhouse, or if he requires *special permission* from the slaughterhouse manager, the Government President of Breslau decides this question as follows on 15th August, 1892:

"In reply to your request that you should be allowed entrance to a public slaughterhouse for the examination of animals for slaughter, and to settle differences of opinion between the slaughterhouse veterinary surgeon and the master butchers, I grant that you may in those cases where you have been selected as official umpire by the possessor of the animal in question, or by the butchers' guild.

"The slaughterhouse management must in every case be notified of the purpose of your visit.

"The costs of a veterinary police examination on private requisition must be borne by the parties interested."

In the Government district of Posen this question is settled for all slaughterhouses by designating a chief expert, who, on the requisition of the magistrates, but only thereon, is called upon to give a final opinion. In these cases not only does the dignity of the departmental veterinary officer carry more weight, but his opinion also is of greater value.

In some large institutions the manager does not exercise any veterinary control which is undertaken by another person with proper qualification, as in Berlin, Hamburg,* Frankfort a/M., Bremen, Chemnitz, Dresden, Hanover, etc.

Generally this separation has not found much support; for in most of the older cattle-yards and slaughterhouses, and also in those recently opened, such as Aix-la-Chapelle, Barmen, Breslau, Danzig, Halle, Cologne, Königsberg, Mannheim, etc., *veterinary surgeons* are appointed as slaughterhouse managers—a proof that in the leading towns it is becoming daily more and more apparent that a *veterinary surgeon* is the only person suited for such a post.

Besides the establishments mentioned above, there are some small institutions in which there is both a manager and a veterinary surgeon, the latter only examining the beasts to be killed. This

*Berlin and Hamburg are so peculiarly situated as compared with other cattle-yards and slaughterhouses that the separation of the post of manager from that of veterinary expert is fully unwarranted. In fact, some little time since the butchers in Berlin petitioned to have each establishment under separate management.

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arrangement obtains in Zeitz, Giessen, and Bromberg. In Görlitz and Meran, managers after veterinary experience have been appointed.

Where the slaughterhouse requires two veterinary surgeons, and a manager without veterinary qualifications is also appointed, there does not usually exist as much work for the latter to do as he might undertake, considering that his salary must be at least £225 to £250, together with a dwelling-house, especially as he will scarcely be able to be so much in the office as to dispense altogether with a clerk. But if the chief veterinary surgeon undertakes the management, but little addition need be made to his salary to obtain a suitable man to act as manager as well, with a saving in salaries to the extent of about £50 to £75. Besides this slight pecuniary consideration, there is another important advantage: a veterinary officer as manager is in a far better position to adjust the differences which so often crop up between the public and the veterinary surgeon regarding doubtful meat. Finally friction between the officials is prevented.

In the kingdom of Saxony the corporations are to a certain extent *compelled* to appoint only *veterinary surgeons* to the position of manager; for according to the statute of 17th December, 1892, the utilisation of the fat and meat of trichinated and tuberculose beasts is only allowed in *slaughterhouses under the oversight of veterinary officials*. If the amount of the remuneration is not sufficient to prevent private practice, it should at least be limited to the district round the town. The official in question should, however, have such a salary that it will not be necessary for him to have a private practice, so that he can have a more independent position. In very small slaughterhouses this cannot be avoided, and his practice will, in some cases, be his principal business and his official functions merely an adjunct.

On page 298 there follows a list of towns with the salaries given to the managers in each and various particulars regarding other emoluments. These vary from £90 to £350, usually including a dwelling-house and heating, and occasionally light. The appointments are nearly always for life and end in a pension.

The salary of the assistant veterinary officer varies considerably. It usually includes a free bachelor's lodging, firing, and £50 in Hirschberg; £67 10s. in Guben; £75 in Osnabrück, Königsberg, Cottbus; £90 in Erfurt, Düsseldorf, Breslau, Coblence, Halle;

£100 in Thorn, Bremen, Barmen, Beuthen; £105 in Stettin (rising every three years by £7 10s. to £150) and Bromberg; £110 in Danzig; £114 in Münster; £115 in Kattowitz; £120 in Lübeck, Kiel, Elberfeld (rising every four years by £7 10s. to £150), Cassel (rising every three years by £15 to £210); £125 in Dortmund, Essen (rising to £185), Aix-la-Chapelle (rising every four years by £10 to £175), Frankfurt a/M., and Cologne.

In Ballenstadt the slaughterhouse manager receives as an addition to his exceedingly small salary twenty-five per cent. of the net surplus of the income. The economy, however, that would certainly be exercised in a case like this might materially affect the success of the business.

The oversight and management of many small slaughterhouses are often conducted simultaneously by the district veterinary surgeon and a private veterinary surgeon. The remuneration for this, however, including meat inspection, is usually very little.

Subordinate Officials.—Amongst other officials there are the clerk and the book-keeper (£75 to £90, and a house and firing); in medium-sized slaughterhouses both offices are undertaken by one person. In smaller institutions, where only a limited number of officials is necessary, it is so arranged that the trichinosis inspectors undertake the office work by turns, at least so far as the issue of slaughter tickets is concerned. The inspectors then get an allowance of £15 to £25 yearly.

If the institution is provided with a cold store, there must be an engineer (wages £50 to £60 annually, also dwelling house and firing), as well as a fireman to run the engine all night when required. An intelligent day-labourer can be trained to do this work, whose wages must be somewhat raised as a fireman, and he can be employed in the winter months, when more killing is done than in summer, as a workman in the halls.

Respecting the number of day workmen, it must be pointed out that *too great* an economy on this point results in heavy wear and tear, and want of cleanliness.

The Trichinosis Inspectors.[1]—It has been recognised for years past that women are especially well suited for this occupation because of their slender fingers and their accuracy and conscientiousness. As far back as 1st October, 1887, the Berlin slaughterhouse formed a

[1] More will be said on this point in Chapter XI., on Trichinosis Statutes.

special inspecting staff of thirty women and girls, while to-day there are there three rooms occupied by women, besides a great number employing men. In a number of other towns, as Belgard, Elverswalde, Eisleben, Graudenz, Köslin, Kolberg, Stolp, Thorn, etc., there are nothing but female trichinosis inspectors, while in other towns, Bromberg, Forst, Kiel, Magdeburg, Stettin, etc., both men and women are employed. This combination is, however, *not* advisable, especially in small establishments where there is only one inspecting room.

In the province of West Prussia a resolution was passed by the Diet that pupils in midwifery trained in Danzig shall receive at the end of their course a training as trichinosis inspectors in the public slaughterhouse, and in Neustadt this double training has been successful.

In some slaughterhouses a fixed salary is paid—for instance, in Forst both men and women get £3 15s. monthly (assistants £2 10s. monthly), in Guben they get £25 annually, in Stettin the men get £60 and the women £45 annually, in Potsdam £45, and in Cologne £75 (assistants £40). As a rule, remuneration is by piecework, the total sum earnt being divided amongst the inspectors, and subject to a deduction for the upkeep of the establishment, apparatus, lighting and heating of the room, as is done, for example, in Gotha (five per cent. from a tax of 7½d.), Eisenach (thirty-three per cent of 9d.), and Düsseldorf (twenty per cent. of 9½d.) In some towns a proportion of the income from the inspection is paid to other officials who are also occupied (as inspection superintendent and test-taker). For instance, in Magdeburg only 6d. of the tax of 9½d. is paid to the inspectors, while the surplus is applied to pay the superintendent of the inspectors (salary £80) and three test-takers (each £55), so that only a small addition from the general fund is necessary. In Elbing 7d. of the tax for inspection goes to the inspectors and 1¼d. to the test-takers. As an average sum (without deduction), 9d. is the highest and 6d. is the *lowest*.

The wages of the test-taker vary very much. As already said, in Magdeburg he receives £55, in Leipzig he gets £65 (some £57 10s.), and in Potsdam and Forst, again, only £45.

The subordinate officials of the slaughterhouse, and also the labourers, may make a claim upon the sick fund.

REGULATIONS[1] FOR MUNICIPAL SLAUGHTERHOUSES.

These are compiled from a large number of examples, and are especially suited for towns of from twenty thousand to thirty thousand inhabitants.

1. The control and management of the municipal slaughterhouse are vested entirely in the town council, and the balance-sheet of the slaughterhouse must be prepared as for other municipal departments.

2. A slaughterhouse committee must consider all questions pertaining to the undertaking, and report to the town council thereon.

3. Usually contains instructions as to the composition of the committee.[2]

4. The chairman is selected by the mayor, and the vice-chairman usually holds that position on the town council. The mayor can be present at the sitting of every committee, has a right to vote in it, and can take the chair.

5. Three members of the committee constitute a quorum, and a majority of votes of those present carries a motion ; in the case of an equal number of votes, the chairman has the casting vote.

6. The committee meets when the chairman considers it necessary, or on the proposition of three members. Should the chairman refuse or delay to call a meeting which has been proposed by the others, the mayor can appoint a sitting, and take the chair at it. The mayor must receive notice of every meeting.

7. The transactions of the slaughterhouse committee must be entered in a minute-book and signed by three members. The chairman can entrust a member of the committee or the manager or clerk to make notes of the proceedings, and enter them into the minute-book.

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[1]The "sanitary committee" (in towns of more than 5,000 inhabitants) can also compel the observation of the law of 18th March, 1868, and 9th March, 1881, within the circle of their operations.

[2]The committee, as has already been mentioned at the beginning of this chapter, can be chosen "either merely from amongst the members of the town council or from the members of both municipal and parish bodies, or from the latter two, and from burghers who are entitled to a vote.

"For this committee, which is subordinate to the council, the town councillors *and* burghers entitled to a vote are chosen by the entire town council, the magisterial members of which are named by the burgomaster, who has also to appoint the chairman from amongst the latter.

"Under certain Acts *special* settlements can be made to suit the *peculiar requirements of various places* as to the composition of the *remaining* members of the slaughterhouse committee."

In consequence of this regulation, we find in some towns a very differently constituted committee.

8. The preparation of all agenda and the business of the meetings must be carried out by the chairman or vice-chairman. The chairman or his representative has also to open all letters or documents, and to sign all those issued.

9. In conducting all the committee's business, the Town Council is to be guided by par. 59 of the Town's Statutes of 30th May, 1893, and pars. 18, 20, 26, to 30 of the instructions for town councils of 25th May, 1835.

10. There should be appointed in a slaughterhouse establishment:

The manager.
The cashier (also bookkeeper).
The hall-master.
The engineer.
The fireman.
The porter.
The night watchman.

Besides the necessary number of trichinosis inspectors or inspectresses and day labourers.

The latter may be engaged and dismissed by the manager, in accordance with the usual trade arrangements.

All the persons appointed, with the exception of the day labourers, are to be regarded as under the control of the mayor. They are obliged to obey the orders issued by the chairman of the committee, so long as they agree with the rules and regulations of the town council, and are always to communicate with him as regards the duties of their office.

They must maintain a kindly, upright, and honourable bearing towards the general public, and must not engage in any kind of business with those using the slaughterhouse; neither must they have any other business.

11. *The Manager.*—The actual management of the slaughterhouse is to be carried on by the *manager*, who must be a certificated veterinary surgeon.

He must arrange the duties of the under officials and the day labourers, and he can punish for irregularities, but he must bring to the notice of the mayor all serious cases, while all differences between the general public and the under officials or labourers are to be settled by him.

All grievances of the officials, the labourers, and the general public against the manager or his decisions are to be settled by the mayor.

The manager can grant the officials leave of absence for a day, but applications for a longer period must be brought before the mayor, who must immediately communicate thereon with the chairman of the committee.

12. The manager must always be present in the slaughterhouse during *killing hours*, but can be temporarily represented afterwards by the hall-master. He is answerable for order, cleanliness, and safety against fire.

13. He has to open all letters addressed to the management, and see that these are entered in a correspondence book kept by the cashier. Copies are to be made and kept of all letters issued from the slaughterhouse. On important questions the manager must consult with the chairman. All books, etc., relating to the management can be inspected at any time by the committee.

14. The manager has to see that the utensils in the inventory are always in a condition fit for use. He is entitled to order small articles or repairs to the amount of £1 10s., if they cannot be made and carried out by the officials or labourers in the institution; but he must immediately give notice to the chairman that he has done this.

15. The manager has to take care that the taxes levied according to the tariff are brought to the office at the proper time and properly booked. He must make up the books every day, after killing is over, along with the cashier and the hall-master, and see that the cashier takes the money to the town treasurer and pays into the bank weekly, or as soon as he has £50 on hand. He has further to see that the cashier prepares a short monthly statement of the receipts and expenses, and that he sends a report of all business done to the committee at the end of each quarter; and at the end of the financial year he must make up a yearly report along with the cashier, and present it to the town council.

16. The manager must inspect all cattle before admission into the slaughterhouse, and must carefully examine the meat killed outside the slaughterhouse, as well as that killed within its walls, according to the police and sanitary regulations.

In all these examinations the hall-master is expected to assist the

manager, and in some cases he can conduct them independently with the manager's sanction.

He must also carefully supervise the work of the trichinosis inspectors.

17. The manager must enter in his books a report of every condemnation of any meat. In every case of a suspected carcase he must report it to the police, and, until their decision is made known, the suspected meat must be carefully kept, unless there is a general police order that all meat unfit for consumption must be destroyed within twenty-four hours, if no objection is raised by its owner.

18. *The Cashier.*—The cashier represents the manager in all untechnical matters, and in some cases these duties are carried out by an official appointed by the mayor.

19. The cashier is expected to conduct the entire financial and book-keeping business of the slaughterhouse, particularly :

(*a*) To collect all taxes levied according to the tariff, and to enter these in the receipt-book ; also to make out and sign receipts for the payees.

Should the balance of the slaughterhouse cash not be sufficient for the necessary payments, advances are to be made from the town exchequer on the authority of the council. The cashier must then keep a separate book showing the payments to the town council, and the advances obtained from it.

(*b*) Payments may be made by the cashier on receiving signed instructions from two members of the town council, and after the manager has vouched for the accuracy of the account in question.

All payments are to be entered in the cash-book.

(*c*) Every day after killing-time the books must be gone through with the manager, and the receipts of the day ascertained. The manager must assure himself of the accuracy of the daily balance, and enter in books to this effect daily.

(*d*) There must be a special record of the dues daily levied for trichinosis inspection, and the weekly or monthly wages paid to the trichinosis inspectors.

(*e*) He must keep the inventory of the loose tools and utensils, and make up a copy of it, to be certified and signed by the manager, and attached to the yearly accounts, special mention

being made of everything which has been added during the year.

(*f*) The money must be placed in the safe, and carefully taken charge of, and then paid into the bank or handed to the town treasurer regularly once a week, or as soon as it exceeds £50.

(*g*) Every month a balance must be struck, and laid before the manager along with the books, who then hands it over to the chairman.

(*h*) Every year a balance-sheet must be drawn up, and handed to the chairman, after being signed by the manager.

20. The chairman of the committee, as well as the manager, can demand at any time to see the cash and receipt-books, and also to have the cash in hand produced.

21. The cashier is bound to look after all the book-keeping work assigned to him by the manager.

22. *The Hall-master* is the representative of the manager in all outside work and all matters concerning meat inspection, except in specially reserved cases.

He has to superintend all the proceedings in the slaughter-halls and in the stables.

He must only permit animals to be slaughtered, after the slaughter ticket has been presented to him and effaced. He has to enter every individual slaughter in the register to be kept by him, which must be balanced up every evening and laid before the manager for his signature.

He must also settle the order in which slaughter is to take place according to the notices which have been given to him, and to take care that the slaughter of the animals is effected without illtreatment and only by means of the stupefying implements provided by the management, and that the places and utensils are immediately cleaned and the latter returned to their places after use.

He has to inspect the condition of the animals most carefully both before and after slaughter, to report the result of examinations to the manager at once.

In *independent* examinations of the animals, he is obliged to acquaint the manager with *every* case of sickness, and only to allow *absolutely* healthy beasts to be passed.

He has to control the admission and retention of the animals in the stalls, and to see that the names of the owners are written on

the slates hung there. He has further to see that the animals stabled are provided with fodder and straw by the men in attendance.

The fodder and straw stores he must keep under lock and key, and only serve out on the presentation of receipts for same, and also keep books showing with exactitude the receipts and expenditure of stock.

Care must be taken in the keeping and proper use of the fixtures, etc., and all contraventions and irregularities reported at once to the manager.

Tests for trichinosis inspection must be taken from the pigs killed in accordance with instructions given in the Trichinosis Act.

The meat which has been found sound is to be marked with the various stamps in the specially-described places.

The orders of the manager must be absolutely carried out on every point.

23. *The Engineer* has to supervise and attend to all the machinery arrangements of the slaughterhouse. He must keep the boiler-house clean and in good order, and only allow those persons to enter the same who have expressly obtained permission from the manager to do so, all others being absolutely forbidden entrance. He must answer for the proper use of the articles and fixtures in his charge. He must keep all the apparatus clean and in working order. He must execute all repairs, as far as his knowledge and skill permit, and the necessary tools and arrangements exist. He must make it his special duty to carry out all the written orders for stokers and engineers.

24. *The Porter* has to look after the opening and closing of the slaughterhouse, and to refuse entrance to all persons who are neither butchers nor have any direct connection with the business thereof, unless they have in their possession a special permit from the manager.

He (the porter) has to give notice to the manager of all animals brought into the slaughterhouse, so that they may be inspected; and he must not allow the animals to be put into the stables before inspection without the manager's permission. It is only after this inspection has been effected that a ticket of entry may be issued to the owner, which can then be exchanged for a slaughter ticket. A register must be kept of the name of the owner, the species of animal brought in, etc.

The weighing of living animals, and in certain cases also of animals that have been killed, must be carefully carried out by the porter, after the owner presents to him a weighing ticket. All weights must be entered in the weighing book. He is responsible for the cleaning of the offices, and the utensils therein, the lighting of these rooms, the dwelling houses, and the stoves.

25. *The Night Watchman* must look after the safety of the whole establishment during the night. His hours of service are to be settled by the manager according to the various seasons of the year.

He has to look after the animals, and in cases where they exhibit extreme restlessness to waken the hall-master. After ten o'clock at night he must try the locks of all the doors. He has to assure himself that the gas and the water are turned off at the main, and that neither in the stalls, halls, nor in the corridors of the dwelling-houses there is any light, or that any unauthorised person is on the premises.

During the afternoon he is at the disposal of the manager, to run errands or to assist the porter at the weighing machine.

There should be a recording clock for the control of the watchman, which should be examined daily by the manager or the cashier when ordered by the latter to look after it.

26. The services of the *Trichinosis Inspectors* (or inspectresses) are controlled by the police regulations concerning the pigs killed in municipal slaughterhouses and presented for examination for trichinosis.

The length of time they are to be employed daily is to be decided by the manager according to the number of pigs to be examined.

27. *The Labourers* are to be engaged by the manager as they are required, subject to the sanction of the chairman of the committee. They are bound to conform to the labour laws, and must render to the manager unconditional obedience.

CHAPTER XI

CORPORATION REGULATIONS.

(REGULATIONS CONCERNING THE USE OF THE COLD STORE WILL BE FOUND IN CHAPTER VII.)

The following regulations and enactments contain important points for the management of a slaughterhouse :

1. Corporation orders concerning the introduction of compulsory killing.
2. Regulations for the inspection of animals killed in the slaughterhouse.
3. Police regulations in connection with the use of the municipal slaughterhouse.
4. Laws concerning the inspection of pigs killed in the municipal slaughterhouse and examined for trichinosis.
5. Regulations for the inspection of the fresh meat brought in from outside the town.
6. Laws concerning the sale of meat in the "Freibank."
7. Police regulation concerning killing and weighing animals.
8. Laws concerning the traffic with horse flesh.

As an *appendix* to this chapter a tariff for slaughterhouse dues is given as well as official notices and registry of the slaughterhouse.

1. CORPORATION REGULATIONS CONCERNING THE INTRODUCTION OF COMPULSORY SLAUGHTER.

By par. 1. of the law concerning the erection of public slaughterhouses, exclusively to be used as such, of 18th March, 1868, Article I. and the amendments concerning the erection of public slaughterhouses, etc., of March 9th, 1881, the following regulations are issued :

Par. 1. Within the municipal district[1] of the town of ——— the slaughter of the following species of animals: Oxen, pigs, sucking pigs, calves, sheep, lambs, goats, kids,[2] horses, dogs,[3] may only be carried out in the municipal slaughterhouse[4].

If an animal of one of the kinds specified in the above list while without the slaughterhouse becomes unable to walk by accident or illness, and the transport of the same to a waggon is impracticable, the slaughterhouse manager, or his representative, must be notified immediately,[5] and he must decide whether the animal is fit for human food or not. In the former case he will permit slaughter at the place where the animal is, and then its immediate transport to the slaughterhouse. In the other case he must give notice to the police administration. In very urgent cases the animals which become untransportable by accident can be killed before the arrival of the slaughterhouse manager or his representative; still, he must be made acquainted with the matter at once, and the dead animal must be taken to the slaughterhouse without being cut up in any way.

Par 2. The following arrangements must be carried out in direct connection with slaughter:

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[1]As mentioned earlier, a corporation can also resolve that the entire work of slaughtering may take place in the slaughterhouse belonging to a *neighbouring* town or parish. (27th February, 1896, Decrees of Chamber of Deputies.)

[2]The slaughter of goats under one month old for private use is permitted, in certain places, to be done outside the slaughterhouse; but cases of sickness after the consumption of kids or lambs have rendered it necessary that these animals should be included in the compulsory inspection carried on in the slaughterhouse.

[3]In several towns, such as Chemnitz, Dresden, Grünberg, Leipzig, Münich, Quedlinburg, and Zittau, dogs are killed in the slaughterhouse, and, of course, come under the law.

[4]In different towns (Bielefeld, Castrop, Eisleben, Hanover, Pasewalk, Rathenow, Oldenburg, Stassfurt) slaughtering for private use is not included in the compulsory order, and in other towns (Köthen and Unna) only partly. Notwithstanding the fact that the slaughterhouse exchequer would be materially increased thereby, it has often happened that salesmen buy killed and uninspected meat from private parties, and then offer it for sale. Further, it often happens that diseased beasts are sold by dishonest butchers to private parties who intend killing, and then the importance and the value of a public slaughterhouse, particularly from a sanitary point of view, are made somewhat illusive.

In Linden private slaughterings can only take place between the months of November and February, and there must not be more than two killings within that time; while in Goslar there can only be one, and then only in December or January.

In Werden (Rohr) the district committee will not give its permission for any private slaughter excluded from the "compulsory killing law," nor will the governing powers of Neubrandenburg allow the municipal bodies in their district to permit private slaughter.

On the other hand, an order to allow *people who are evidently poor* to use the slaughterhouse for killing what they require for private use *without having to pay anything*, cannot be objected to.—(Allenstein.)

[5]In Bremen there is a rule that a veterinary surgeon must certify before killing that it is *impracticable* to convey the animal to the slaughterhouse alive. If in isolated cases it is not possible to await the arrival of a veterinary surgeon before killing, he must be informed of the slaughter within an hour after it has taken place. The opening, etc., of the killed animal is only allowed on the approval of the veterinary surgeon who must have been called in.

The skinning, disembowelling, and scalding of the animals killed.

The cleansing of the meat and inner organs after slaughter.

The scalding and cleansing of various parts of the body, and the tallow melting[1] may only be undertaken by the municipal slaughterhouse. Calves, after they have been slaughtered and cleansed, may be taken away from the slaughterhouse in their skins.[2]

The blood of animals killed in the slaughterhouse may only be taken out of the slaughterhouse if it is, in the judgment of the manager, fit for human food.[3] Bristles, hairs, claws, and the manure from the bowels must not be taken out of the slaughterhouse without the permission of the slaughterhouse management.

Par. 3. Every living animal brought into the slaughterhouse for the purpose of slaughter must be subjected to inspection, both before and after slaughter, by an expert appointed by the municipality for that purpose, in order to ascertain the state of its health. In case of any difficulty occurring, like that described in the latter part of par. 1, the animal must be examined after slaughter, in accordance with the rule in that paragraph.

Par. 4. All fresh meat not killed in the public slaughterhouse—including that obtained from horses and wild boars, and also the interiors of those animals which are used for human food—must not be offered for sale within the radius of the town of ——— until it has been submitted to the inspection[4] of an expert authorised by the municipality, according to the regulation issued for this purpose.[5]

Par. 5. Fresh meat[6] which has been imported must not be

[1]Tallow-melting is not included in the "Compulsory Slaughter Laws," but according to the preamble to the law of 1868 corporations are authorised to make such a rule, if they see fit.

[2]This exception can be permitted for the so-called "paschal lambs."

[3]Compare the remarks on par. 17 in No. 3 of this chapter.

[4]A regulation can also be enforced that the dues do not go to the slaughterhouse exchequer, but to the city treasury. Comp. law, 1868, par. 2, No. 2.

[5]In Landsberg the following is added here, "For the carrying out of this regulation, not only is the person who brings in the meat answerable, but also the buyer thereof, should the latter not have bought the meat in question in a public place of sale in this town.

Compare this paragraph with the remarks on No. 5 in this chapter.

[6]According to a decision of the Supreme Court of Judicature of 30th January, 1896, a police order, which commands that meat already inspected officially *once*, must be *again inspected* when taken into another meat inspection district, is *not valid*; it does not require to be submitted for inspection a second time.

In opposition to this the same court decided on 10th September, 1896, that a police order which commanded a *second* inspection was *legally* valid; the court should *not* have to test the *effect* of such an order. Compare the remarks on par. 1 of No 5 in this chapter.

By a judgment of the Supreme Court (20th of January, 1898), it was further decided that even if imported meat has been *previously ordered*, and even if it has been already inspected, *the inspections must be repeated in the place into which it has been brought.*

prepared for use in the hotels or restaurants within the radius of the town until it has been submitted to a similar inspection as is described in par. 4.[1]

Par. 6. Those persons who practise the calling of meat salesmen as a regular trade within the radius of the town of ——— *shall not offer for sale* meat which they have not killed, or had killed for them, in the municipal slaughterhouse, and *shall not offer for sale* meat which they have killed, or had killed for them, in another

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By the decision of the Imperial Court it is settled that a *garrison kitchen* cannot be regarded as a trade dealing with meat. The meat imported from other places for use in garrison kitchens need not be submitted to a second inspection if it has been once officially inspected (case of Allenstein, Osterode, Prussia).

[1] In Dresden, pork obtained by private parties from other places for home use, and all products made from it (sausages, etc.), must be laid before the municipal inspecting official for examination for trichinosis, whether an inspection has taken place already or not. Similar orders hold good in Plauen, Hamburg, and Leipzig. The order issued by the magistrates of this town runs as follows:

"Par. 1. Fresh, salted, or pickled meat introduced into the district must be inspected by a veterinary surgeon or trichinosis inspector for whatever purpose it may be intended.

"Par. 2. The meat liable to inspection according to par. 1 must only be brought into the town radius in large pieces, as follows:—

"I. **Oxen,** whole animals (four quarters with head), English roasts (rump and sirloin), sirloin alone, livers and tongues.

"II. **Calves, sheep, and goats,** whole animals, half animals (whether cut across or lengthwise), backs (whether long or short, but always with the kidneys), legs.

"III. **Pigs,** whole animals, half animals (only cut lengthwise), pigs' backs (only with the rasher cut—with the skin on), legs of pork, tongues and livers.

"IV. **Horses,** only whole animals.

"*Dressed*, blown out, chopped or minced meat, or meat in smaller pieces than that stipulated in I.-IV., and finally meat killed from necessity or else coming from unsound beasts, is not allowed to be imported into the town.

"Par. 3. To the imported meat, liable to inspection according to paragraph 1, there must be subjoined a certificate from a qualified veterinary surgeon or from the magistrate of the place where it was killed, in which it is assured by the certifier on the strength of his own observation that the animal from which the meat comes had no perceptible appearance of disease directly before slaughter, unless it is stamped with a perfectly distinct mark recognisable as belonging to a slaughterhouse conducted under veterinary police superintendence. The day of slaughter must be given on the certificate, and finally the inner organs which may accompany the meat—and then only with a whole animal—must be so marked as to show that they really are part of the animal in question."

In different places, Weimar, Gera (22nd November, 1897), decrees have been issued of late, according to which sausage goods, etc., must not be offered for sale until they have undergone inspection, and have been certified or stamped in the inspection station, slaughterhouse, etc., from which they have been imported.

On this point Ostertag says ("Handbook of Meat Inspection"):

"The slaughterhouse law does *not* offer sufficient means for the control of meat consumption in the towns provided with slaughterhouses, for it does *not* prescribe compulsory inspection for the very meat which urgently requires control, namely, that imported for *sausage* manufacture and preserved meat which is brought into the town. Meanwhile, the law on police management, of 11th March, 1850, can be brought into action for the correction of this omission, as is already done in several Government districts regarding preserved pork."

The Duchy of Brunswick has made the following regulation regarding the importing of *foreign* meat:

"Any importer of foreign meat (prepared meat and sausage goods included) for traffic must first submit it to the acting meat inspector in the place where he dwells; and if it is pork, or consists of goods made from pork, it must also be examined by the trichinosis inspector. For such inspection the orders in this law, and in the law of 15th March, 1866, on trichinosis inspection, can both be brought into force as occasion requires. *Whoever intends to offer for sale such foreign meat must make it perfectly plain to all purchasers what its origin is.*"

slaughtering-place . . . . . miles[1] distant from the boundary of the town.

Par. 7. The *fresh meat* not killed in the public slaughterhouse must be offered for sale *separately*[2] from that which is killed there, both in public markets and in private shops, and must be marked distinctly as such with a ticket[3] which is not effaceable. Foreign meat must be marked in a similar manner.

Par. 8. Dues[4] are levied for the benefit of the public slaughterhouse, and also for the inspection of animals and meat (pars. 3-5),

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[1]In Barmen the distance is extended to 15 kil., in Landsberg to 25, in Danzig, Eisleben, Frankfort a/M., Halle, Hamburg, Cologne, Spandau, Stolp, etc., to as much as 50 kil. Most towns limit the extent to about 30 kil. (twenty miles), reckoned from the centre of the town. (See footnotes to Chapter II.)

According to a decision of the Supreme Court, the traffic in meat killed elsewhere than in the town cannot be forbidden *altogether*, and it is *not* intended by the law of 1868 and 1891 (see Chapter II.) On the contrary, it can be imported if accompanied by a voucher stating that an inspection of the living animal has already taken place in a public slaughterhouse by a veterinary surgeon or by an official meat inspector. The validity of such a local order is established by the decision of the Supreme Court of the Empire of 27th January, 1888, "for definite orders regarding the inspection were to be understood and allowed for (by the law of 1868-1881), and a regulation was to be drawn up by the corporations making special limitations. The corporations in question were thereby authorised to prescribe certain conditions for the inspection of meat, without which their purpose — to prevent the importation of meat dangerous to health as an article of diet—could not have been attained. According to the law forbidding the adulteration of articles of diet (1879 section—meat and sausages), it cannot be regarded as a sufficient proof that the meat can be utilised without danger as an article of diet for mankind, merely by an inspection of it as dead meat, if it has not been otherwise ascertained that the animal from which it came was in a sound state of health before it was killed, and had no disease of any kind about it. Therefore the corporation (of Berlin, say) must demand vouchers of inspection drawn up by magistrates, officials, or private parties outside Berlin."

A decision of a similar kind was given by the Supreme Court on 18th June, 1888, "for according to the opinion of experts it is only a double inspection which grants sufficient security for the soundness of meat. The law demands a double inspection of all meat offered for sale in the town. Thus the inspection to be carried out beyond the radius of the parish is only a preparation for a later inspection in the town."

A similar command is laid upon the county councillors of districts for the introduction of a general obligatory meat inspection to see that police orders respecting this are drawn up according to a form recommended by the Government: "Whoever imports fresh meat for purposes of traffic must bring along with it a certificate from the magistrates of the place or from a veterinary surgeon, stating that the animal was in a sound state of health at the time of slaughter."

[2]According to a verdict of the Supreme Court of 6th June, 1895, a police order is *valid* which commands that meat killed somewhere else than the place where it is offered for sale must be described as such, and must be kept *apart* from meat killed in the municipal slaughterhouse when offered for sale in the same place. This order is authorised by the commands in the law of 1868-1881. There can be no doubt that if meat is hung up in butchers' shops it is being offered for sale. That to hang the different meats alongside of each other is not to be regarded as a *separate* offering for sale in the sense of the police order, the letter of the same leaves no room for doubt. (Compare footnotes in Chapter II. and No. 5 of this chapter.)

[3]Hartenstein (in his "Records of Veterinary Science," book XII.) proposes that this ticket should state that *no guarantee whatever* can be given for this meat.

In Halle the same regulation holds good for the animals killed out of necessity in the slaughterhouses as for those imported from other places.

With regard to another important restriction on meat killed before importation, compare the cold store regulation (Chapter VII., par. 7.)

[4]In various towns (Bütow, Hamburg, Harburg, Stolp, etc.), the full slaughter dues are repaid to the owner as soon as the meat of a whole animal is withdrawn from consumption. If the meat is relegated to the Freibank half the dues are returned.

the tariff for which must be fixed for at least a year by the municipalities.

Par. 9. This statute becomes operative on the day on which the municipal slaughterhouse is opened for public traffic.

The prohibition of the using of other slaughtering-places than the public slaughterhouse can be enforced six months after the promulgation of this statute, but *not before* the actual commencement of operations in the public slaughterhouse.

2. REGULATIONS FOR THE INSPECTION OF ANIMALS KILLED IN THE SLAUGHTERHOUSE.

Par. 1. The inspection of the animals to be killed in the municipal slaughterhouse must take place, before and after slaughter, by the manager or by the expert appointed for this purpose.

Par. 2. Animals, which on inspection are suspected of disease, may be put in rooms or spaces set aside for the purpose, to undergo further inspection.

Animals which are found to be diseased, and the flesh of which does not appear suitable for human consumption, must not be slaughtered in the common slaughter-halls; when necessary, these should be killed in the police slaughterhouse. The discovery must be made known to the police, whose decision must be given before they can be killed; these animals must be stalled in special buildings fitted up for the purpose (lairage for diseased animals).[1]

Par. 3. As soon as slaughter is accomplished, the butcher who slaughtered the animal must either announce the fact in the office of the manager (or to the clerk in the general office, or to the hall-master) himself, or by one of his people for whom he is responsible.

Par. 4. Before the slaughtered animal is inspected and after it has been pronounced sound and stamped, it must either be cut up in pieces or removed from the slaughter-hall whole. Horned animals, horses, and pigs can be cloven right through once; the latter must remain hanging together by a portion of the backbone.

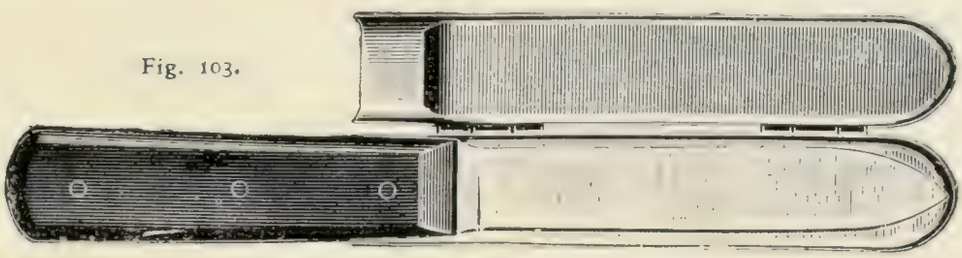
The parts which belong to each animal must be kept in close proximity to each other, so that there is no possibility of error. An exception is made in favour of the interior parts to be cleaned

[1] According to a decision of the Supreme Court (28th December, 1893), the order that a sick animal, or an animal suspected of being diseased, shall be sent into the slaughtering-place as a sick beast, is not contrary to par. 2, abs. 2, of the law of 1868 and 1881, and can, according to par. 2, be regarded as lawful.

Fig. 102.

Meat inspector's knife with nickel casing.

Fig. 103.



Meat examiner's knife with nickel sheath.

Fig. 105.

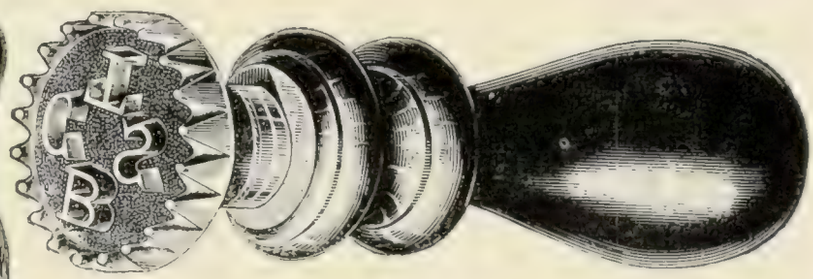


Fig. 104.

Meat stamp (Hamburg).

(The edge of the stamp being formed of dots makes a clean impression on the meat.

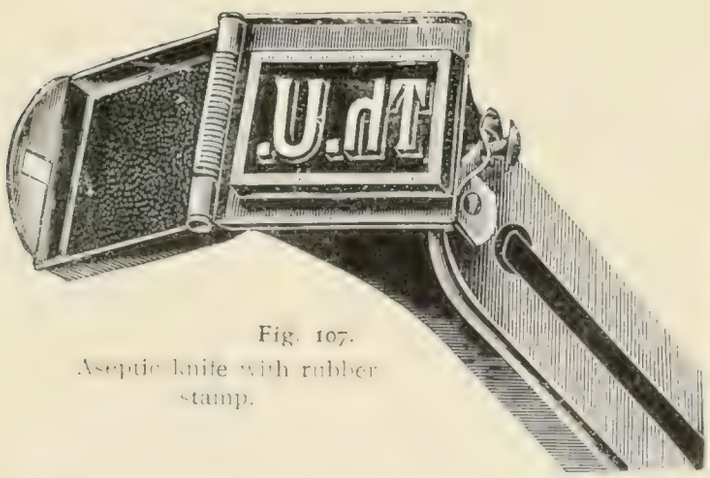


Fig. 107.

Aseptic knife with rubber stamp.

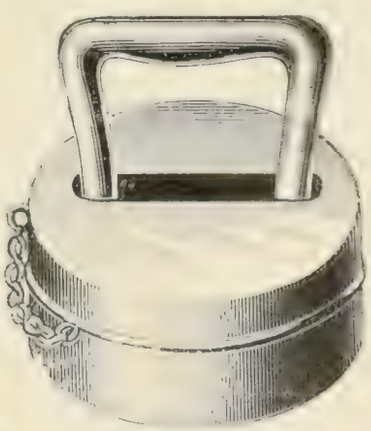


Fig. 106.

Fig. 108

Meat examiner's knife and stamp (Koch).

MEAT MARKING AND MEAT INSPECTION INSTRUMENTS

(stomach, etc.), but these must be sent at once to the tripe-house to be cleaned and then brought back and laid beside the other parts.

Par. 5. The inspection[1] must be made not only as to the quality of the meat and of the blood, but also as to the quality of the large cavities of the body (mouth, breast, belly, and the pelvic cavity), the entrails, the heart, the lungs,[2] liver, kidneys, and sweetbread.

In horned animals the "fourth stomach," and in female animals the uterus, must always be submitted to a specially careful examination.

Horses must further be examined with special regard to glanders of the skin or of the cavities of the head, and the larynx, lungs, and the lymphatic glands must be carefully inspected.

Par. 6. The thorough inspection of the slaughtered animals, at which the owner or his employees are expected to render any help necessary, must not be hindered in any way. The portions of the animals necessary for inspection are to be handed over willingly, but the persons entrusted with the inspection are authorised to remove the portions themselves if they wish.

The owner has no right to object to the mode in which the inspection is proceeded with.

Salesmen and their assistants, who discover or suspect that an animal, or part of it, is unsound at or after slaughter, must acquaint the slaughterhouse manager with the fact immediately.

It is absolutely forbidden to remove diseased animals *before* they have been *thoroughly inspected*.

Par. 7. The meat and the other parts of the slaughtered animals which are pronounced sound and marketable must be marked with the slaughterhouse stamp in a manner which will easily be recognised, the stamp being of this form ——.[3]

Par. 8. The inspection of slaughtered pigs for trichinosis will be carried out according to the rules laid down in the police order concerning the same.

---

[1] Figs. 102 and 103, page 281, give illustrations of a practical inspection knife, with a sheath, by Dr. Ströse.

[2] The following addition is found at the end of par. 32. of the slaughterhouse statute in Bockenheim, 9th July, 1892 (par. 5):

"The lungs of slaughtered animals must only be taken out of the breast cavity in the presence of the slaughterhouse *overseer*, and if they do not appear sound, they must be left adhering to the windpipe and the neck until the arrival of the manager" (par. 5).

[3] Compare this par. with par. 9 of the Regulations (par. 7).

While it was at one time the custom to affix pieces of lead to the meat pronounced sound, a method as expensive as it is tedious, stamping by means of indiarubber or metal dies is in vogue

Fig. 109.
Meat examiner's knife (Berlin).

Fig. 110.
Meat examiner's pocket knife (Berlin).

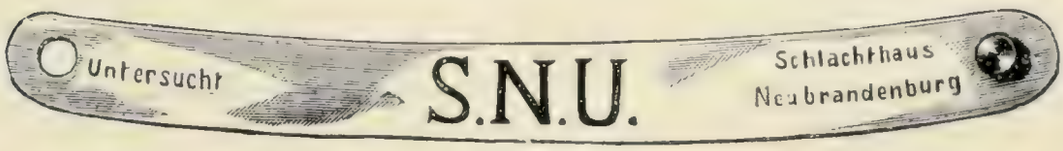


Fig. 111.
Aluminium meat seals.

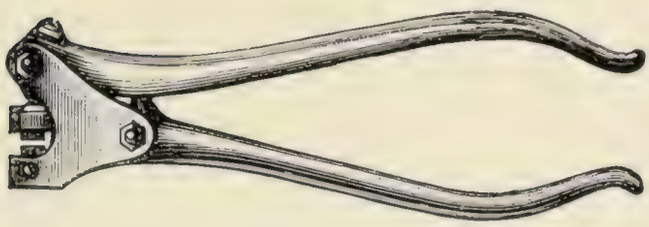


Fig. 112.
Forceps for closing seal markers.

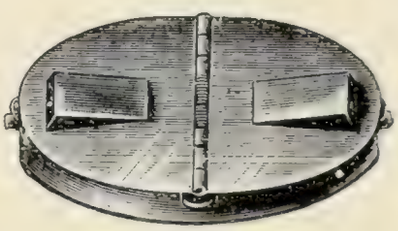


Fig. 113.
Pocket stamp for meat (closed).

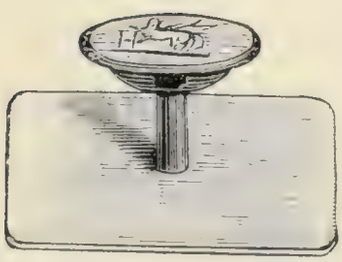


Fig 114.
Earmark.

Fig. 115.
Earmark.

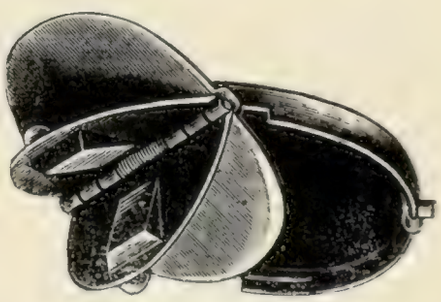


Fig. 116.
Pocket stamp for meat (open).

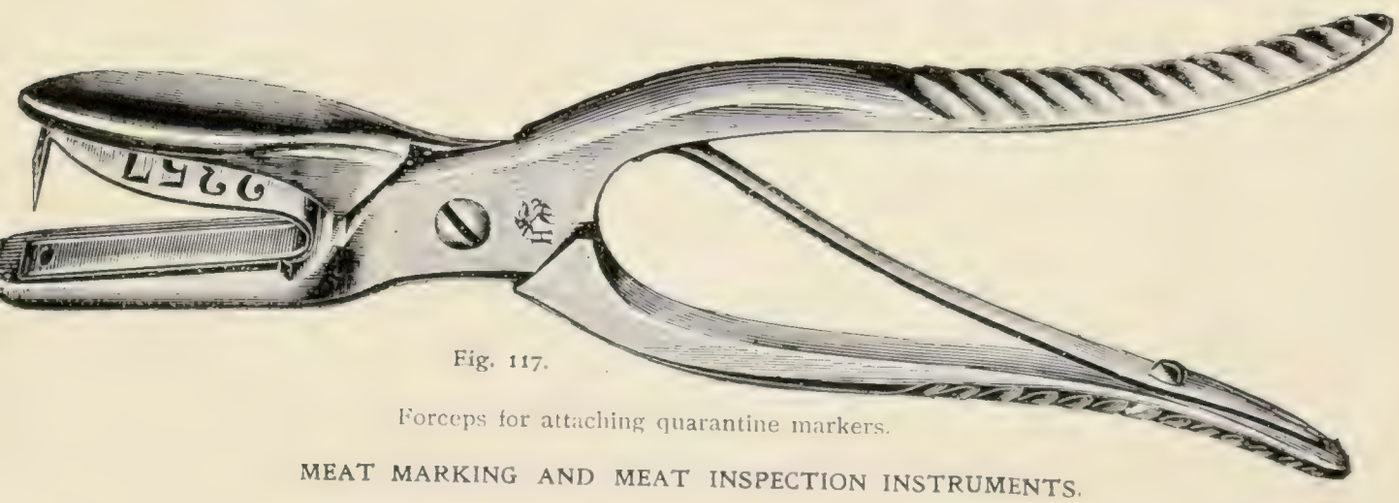


Fig. 117.
Forceps for attaching quarantine markers.

MEAT MARKING AND MEAT INSPECTION INSTRUMENTS.

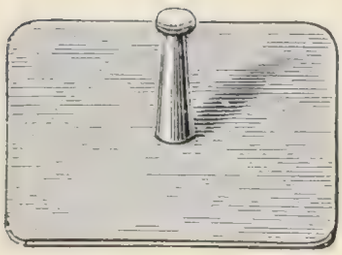


Fig 118.
Earmark.

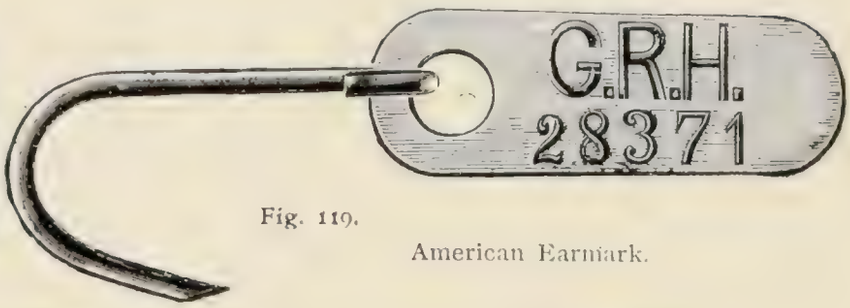


Fig. 119.
American Earmark.

Fig. 120.
Indiarubber stamp.

Fig. 121.
Indiarubber stamp

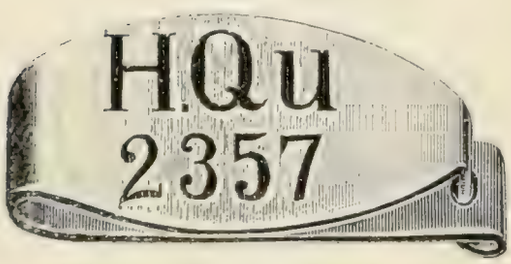


Fig. 122.
Quarantine mark.

Fig. 123.
Quarantine mark.

Fig. 124.
Quarantine mark.

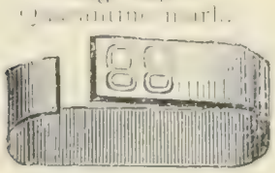


Fig. 125.
Small Earmark.

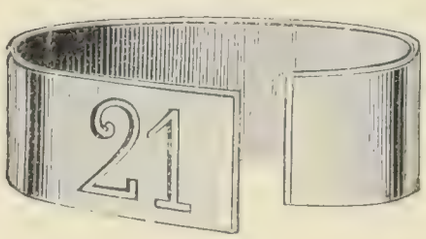


Fig. 126.
Large Earmar

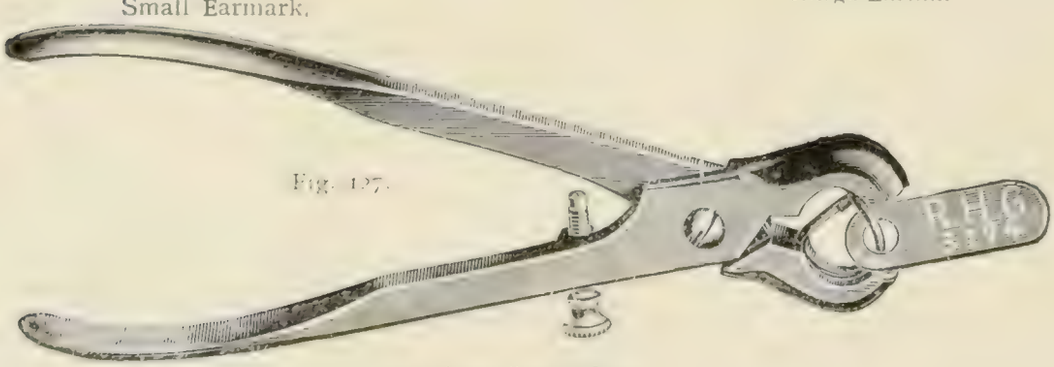


Fig. 127.

American Earmarkers.

Par. 9. Meat which is proved unsuitable for human consumption is to be placed in the custody of the manager, along with all the parts belonging to it, until the police, who are to be made acquainted with the facts, have ordered the same either to be utilised or destroyed.[1]

If no decision can be given at once as to whether the meat can be used or not, it must then be "set aside as objected to *pro tem.*,"[2] and given into the custody of the slaughterhouse manager until a decision has been arrived at.

If the meat comes from an animal which has suffered from an infectious disease, immediate action is taken according to the legal requirements.

Par. 10. The meat which has been objected to, and the organs belonging to it, must be taken to the building appointed for keeping such meat, by the owner or one of his employees.

It is forbidden to remove meat which is objected to, or portions thereof, out of the slaughterhouse or the building in which it is kept.

---

everywhere. The latter wear better, and make a deeper puncture, and are accordingly absolutely the best, especially if similar to that shown in fig. 104, or to that in fig. 105, page 281, having a punctured or serrated edge. Some have only a small metal handle, and can be kept in a little metal box (fig. 106), easily put in the pocket, while the boxes for holding the larger stamps can be hung to the belt by a strap. The stamps with too many words, or with crests, etc., are not to be recommended, while single letters (St., Sch., St. = Städ, Schlachthaus, Stolp) give a clear, distinct impress. Those with changeable dates are quite superfluous, as if used often and with force they easily get out of order.

Fig. 108, page 281, shows a very convenient inspection knife, fitted with a stamp, after a design given by Director Koch.

Special care must be exercised in choosing the colouring used for the die.

It should have the following properties: It must (1) be uninjurious for human consumption; (2) it must be suitable for all sorts of dies; (3) must adhere to the meat easily and make a clear impression; (4) it must penetrate into the upper surface of the meat; (5) it must dry quickly; (6) and finally the impression must distinctly remain visible after meat has been treated with preservatives. According to *Edelmann*, a writer on veterinary matters, these colours may be *(a)* vegetable, *(b)* aniline or tarry. Those prepared and patented by C. Krawutschke, and analysed by Edelmann, fulfil all these conditions, and those patented by Aug. Leonhardi are unobjectionable in every respect. They resist very strong tests, and remain distinctly visible after pickling and smoking, particularly the blacks, blues, and violets.

The author can give a like testimony of the colours prepared by Schelhas, which have been in use for many years in the slaughterhouses of Berlin and Stolp. Of the colours which are used —violet, blue, green, red, black, and brown, the latter is the best.

Bertram, of Berlin, has just introduced a tattooing apparatus, the prongs of which go through a layer of colour at every impression, so that the tattooing is indelible, and may be used with equal success for living animals and dead meat. This apparatus is considered very satisfactory.

A simple method of *branding*, which is not dangerous in the handling, has been constructed by H. Hauptner, known as the benzine branding apparatus.

[1]According to decision of the O. V. Ger. Court of 14th October, 1893, the police are justified, by virtue of the law of 11th March, 1850, in authorising the destruction of meat dangerous to health if it is from an animal belonging to a *private party* (not a butcher). (Compare with this Chapter XII., which records the decision of another court, 4th June, 1897.)

[2]The Supreme Court of the Empire (decision of 30th May, 1884) determined that the municipal veterinary officer in Berlin is responsible for the carrying out of these confiscations according to the rules in the regulations for that city, and if not faithfully fulfilled is liable to be punished. (Prus. Law Book).

Par. 11. If a whole animal is objected to, the owner thereof is justified in demanding a voucher[1] containing the reasons for the objection. If he is dissatisfied with the judgment of the manager or of his representative, he is at liberty to call for another inspection by an expert to be appointed by the police, provided he does so within twenty-four hours after the first inspection, and gives notice of his intention to the manager, who will then allow the second inspection to take place.

[1] In 1895 Manager Völkel, of Elbing, made inquiries of a great many slaughterhouses regarding this question, and discovered how different were the orders respecting such vouchers in the various towns. In Conitz and Lauenburg, for instance, no attestation whatever was given for objected to meat.

A. Notices are given for whole animals without payment of dues in:

(a) Berlin (only notice sheet for organs), Brandenburg, Frankfurt, Greifswald, Heilbronn, Insterburg, Landsberg, Lübeck, Mühlhausen, Rostock, Stolp, Thorn, Tilsit.

(b) *For whole animals, organs included,* Bielefeld, Bromberg, Cassel, Chemnitz, Coblentz, Colberg, Cottbus, Culm, Dessau, Eisleben, Frankfurt, Göttingen, Goslar, Halberstadt, Hamburg, Hanover, Inowrazlaw, Karlsruhe, Kiel, Kreuznach, Mannheim, Münich, Gladbach, Münster (for organs only if they are worth more than 3s.), Myslowitz, Naumberg, Nüremburg, Prenzlau, Stendal, Schneidmühl, Strasburg, Schweidnitz, Wesel, Weissenfels. In Crefeld and Erfurt the value of the animal objected to is attached to the notice if the buyer desires it.

B. Dues are levied:

(a) For the slaughterhouse treasury: 3s. in Barmen (for every attest), Magdeburg, Danzig (no attest for single organs); 2s. in Gera, Halle, Königsberg in Pr., Zwickau (also for single portions); in Dresden 2s. for whole animals, 1s. for single portions; 1s. in Elbing (not for single portions); in Lüdenscheid (for whole animals and valuable organs, or the manager may charge 3s. for a detailed notice), Nordhausen; 1s. in Giessen, Spandau, Potsdam (here also 3s., as in Lüdencheid); 6d. in Hildesheim for whole animals and single portions; 3d. dues for making out the notice, besides 1s. 6d. for stamping dues are levied in Wiesbaden for whole animals and portions of such.

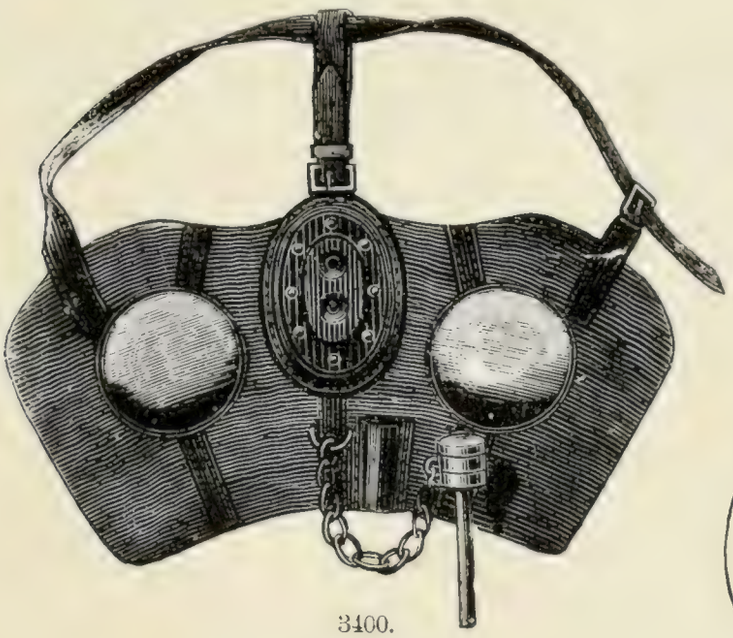
(b) For the slaughterhouse veterinary officer: 3s. (for whole animals and single parts) in Bochum, Dortmund, Düsseldorf, Rathenow, Remscheid; 3s. (only for whole animals) in Bentheim, Elberfeld, Grandenz, Guben, Hagen (and organs of considerable value); 2s to 4s. in Stralsund; 2s. to 3s. in Cologne, Leobschütz, Liegnitz; 2s. in Leipzig (organs 1s.), Münich; 1s. 6d. in Stuttgart, Augsburg, and Marienwerder, Bamberg; 1s. in Meissen: 6d. to 3s. in Marburg; in Neisse 4s 6d. for oxen, 3s. for pigs, 1s. 6d. for small beasts; in Swiemund 3s. for oxen, 1s. 6d. for calves and pigs, 1s. for small beasts and single organs: in Horde 3s. for oxen and 2s. for pigs. In Osnabrück the slaughterhouse veterinary surgeon charges according to the veterinary tax, in Oppeln according to the extent of the inspection. In Brunswick the manager gives private notices for whole animals. In Gleiwitz, Paderborn, Ratibor, Stettin, notices are given only after the veterinary tax is paid. In Darmstadt the taxes for the whole animal (6d. to 1s.) go half to the umpire and half to the slaughterhouse treasury.

With regard to the obligation of stamping this notice, it must be remarked that these are stamp free, as long as the object they concern is worth not more than £7 10s. (Par. 4 of the law of 31st July, 1895.) *Official* notices are dutiable if the objects are of high value, *private* notices are free if this be expressly stated.

As most managers use an official stamp, they can do this stamping.

The following rules must be observed in marking these notices: In sticking on the stamps it must be done so that a narrow space is left between the stamps affixed near to each other. On each stamp there must be marked the date (in figures), the business number and the place, these being in the lowest part of the stamp, so that the business number and the date are marked always on the stamp, although partly on the paper surrounding the stamp. The stamped impression must, as is seen on fig. 129, be partly on the stamp and partly on the paper round about it. According to par. 15 of the Stamp Duty Act, the document must be stamped not later than a fortnight after it is drawn up. It is well to have the stamp paid *before* the document is drawn up, in order that there may be no occasion afterwards to pay a penalty for omission.

If the judgment[1] of the slaughterhouse expert is confirmed, the owner must bear the expense of this inspection. Should the experts differ in their verdicts, the police call in an umpire on the motion of



3400.

Fig. 128.

Brunneau's mask for slaughtering cattle.

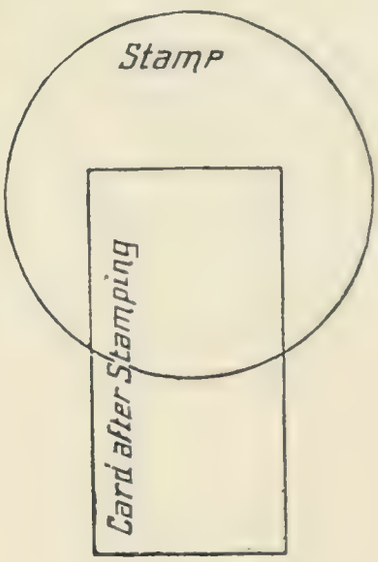


Fig. 129.

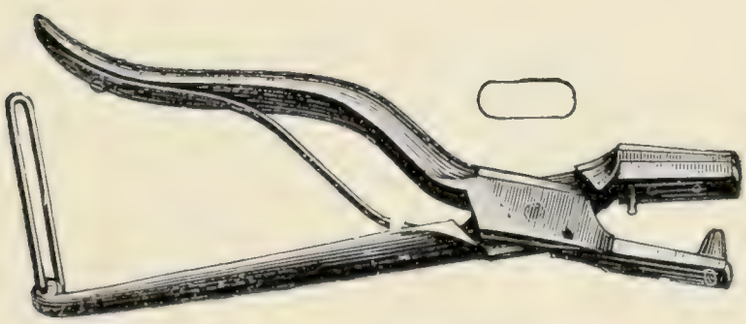


Fig. 130. Punching forceps for earmarks.

[1]These rules of course are drawn up for a slaughterhouse with only *one* veterinary surgeon. In Chapter X. there is a detailed account of contrary and favourable opinions.

It is advisable that the manager should *take down a deposition* of any opposition raised against an "objection" (to meat) and not leave the other party to bring his motion before the police himself. In Stolp this method has proved most efficacious, especially in so far as many persons will withdraw their objection, and thus all further complications are avoided. Instead of obtaining a second opinion by the veterinary surgeon of the district, a *final* opinion can be obtained from the *departmental* veterinary surgeon direct, thus omitting the *district* veterinary surgeon altogether. This is very troublesome, if the *department veterinary surgeon* does not live in the place, and the increased costs prevent *frivolous* objections against the judgment of the slaughterhouse expert, as often happens otherwise.

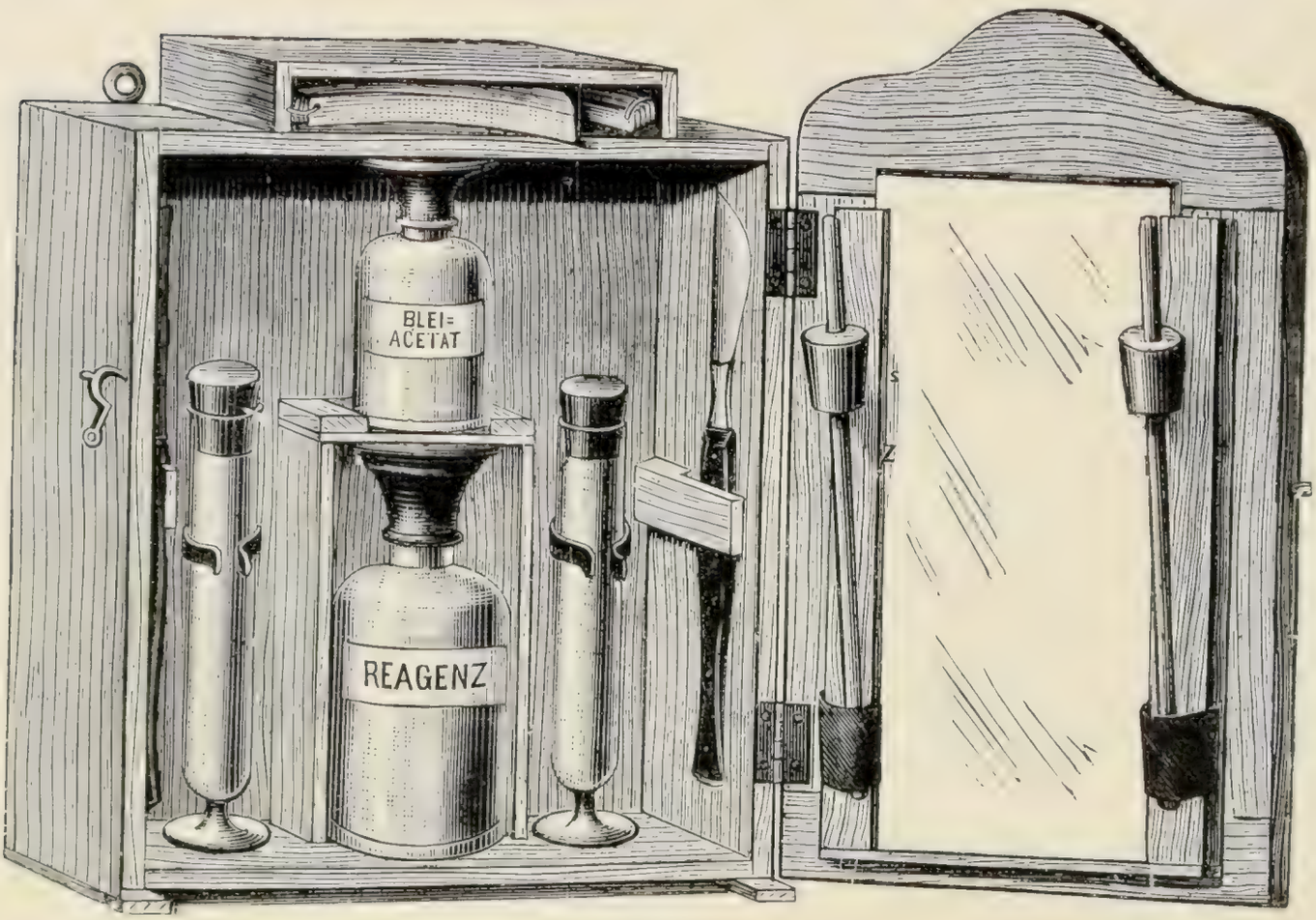


Fig. 131.
Testing cabinet for the examination of animal food.

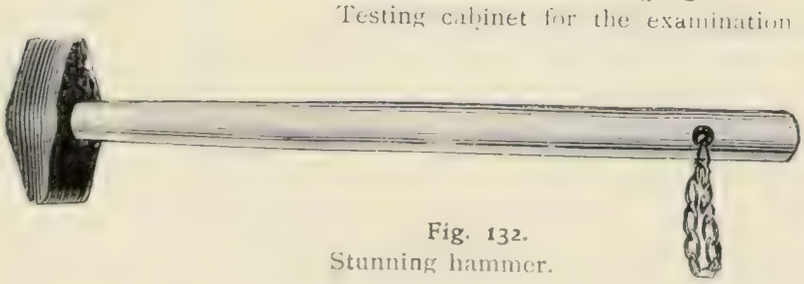


Fig. 132.
Stunning hammer.

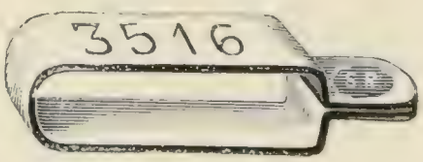


Fig. 133.
Aluminium Earmarkers for cattle or smaller animals.

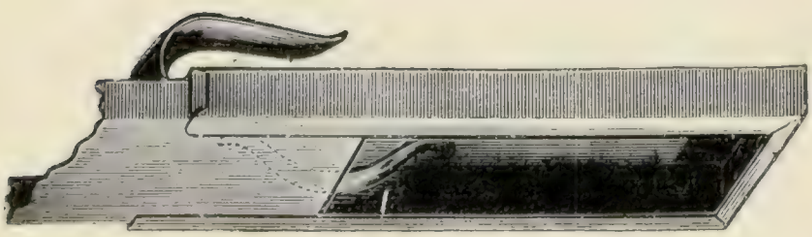
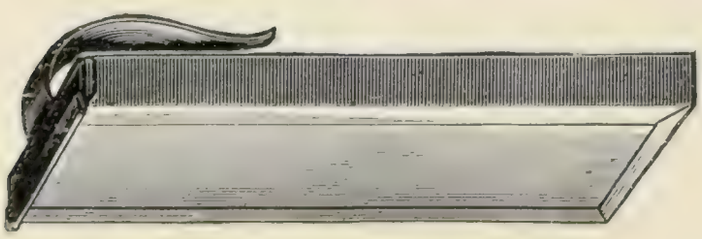


Fig. 134



Aseptic metal sheath for one knife.

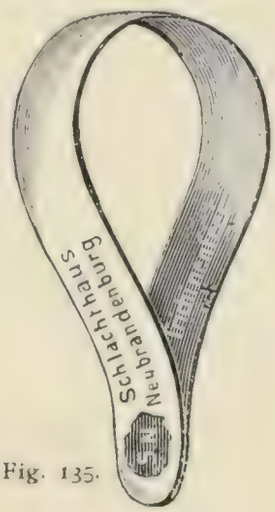


Fig. 135.
Earmark.

SLAUGHTERHOUSE ACCESSORIES.

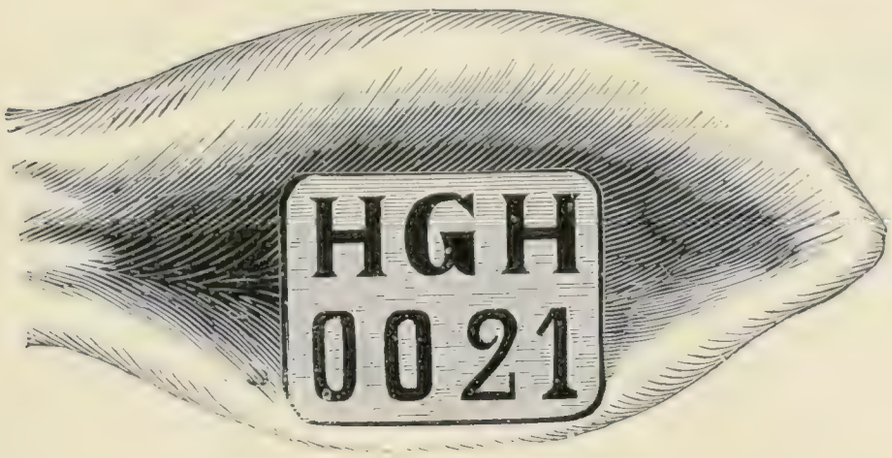


Fig. 136.
Earmark.

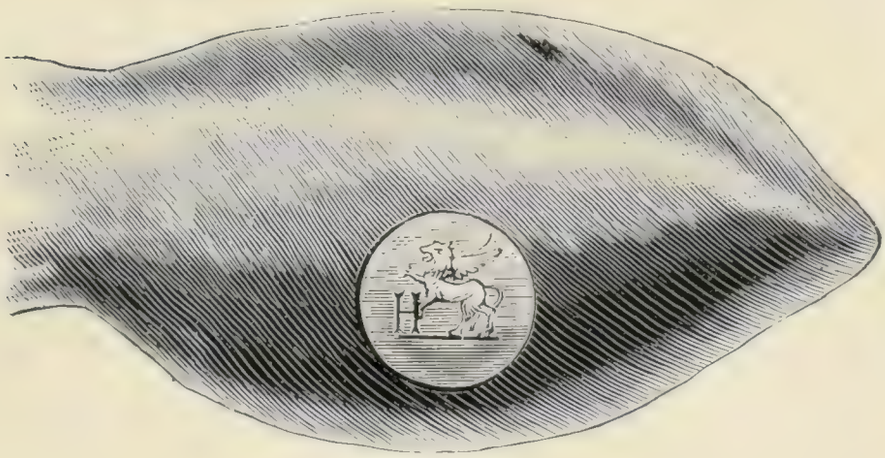
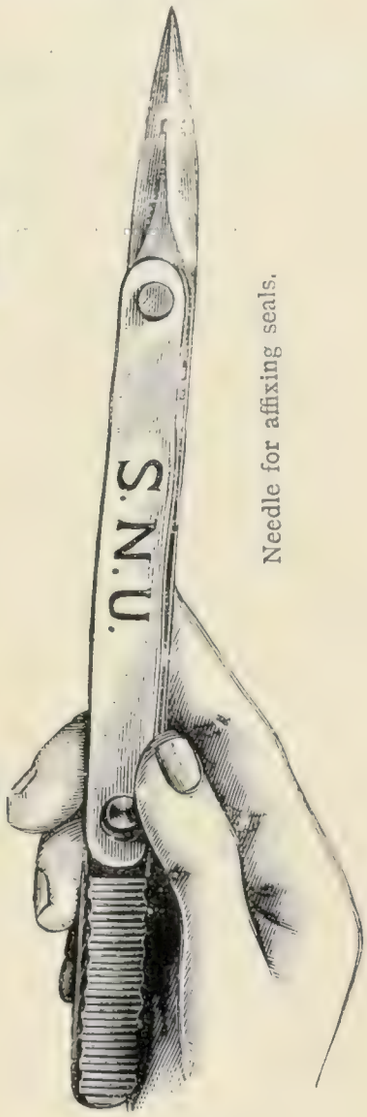


Fig. 137.
Earmark.



Needle for affixing seals.

Fig. 141.

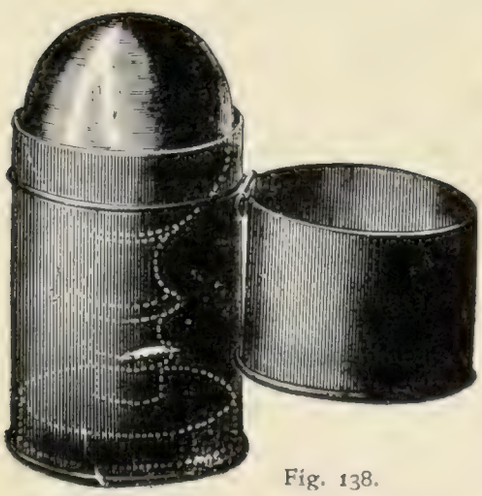


Fig. 138.
Meat ink stamp with wooden handle in round tin box.

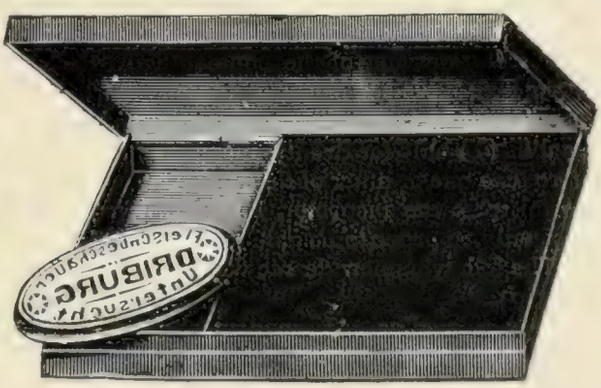


Fig. 139.
Pocket inkpad and meat stamp.

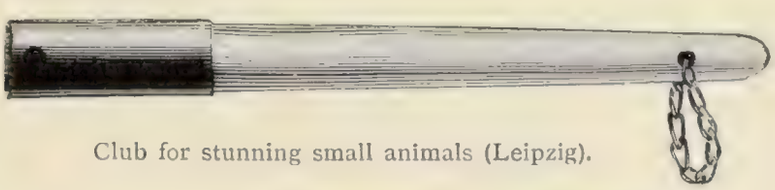


Fig. 140.
Club for stunning small animals (Leipzig).

one of the parties interested. If such a motion is not made, the decision of the manager is final. The losing party must pay the expenses of the umpire.[1]

If it should only be a single portion (organs[2]) of the slaughtered animals which give occasion for objection, the proceedings in connection with the condemnation of the whole animal hold good, in so far as the owner can make use of his right of protestation *immediately after* the *declaration of the objection*.

A voucher as to the organs and parts objected to is not given. It is the business of the owner to furnish particulars thereof.

Par. 12. Regulations as to penalties.

Par 13. These regulations come into force at the opening of the slaughterhouse.

3. POLICE REGULATIONS CONCERNING THE USE OF THE SLAUGHTERHOUSE.

Par. 1. *Business Hours.*[3]

The slaughterhouse is to be opened every week day, from .....

.....

Killing must not take place on Saturday afternoon.

By permission of the manager, killings which cannot be delayed may take place on Saturday if double slaughter dues are paid.

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[1]Ostertag, like many other writers, and as the author has emphasised already in another part of the book, holds that the expenses of a second inspection should be borne by the party *who is in the wrong*, as in similar cases in the public administration of justice. To lay the charges to the victorious one of the contending parties sets at defiance every legal feeling of right and wrong, as it has been remarked by the Chairman of the Supreme Court of Berlin.

[2]It cannot possibly be expected that the management should keep all organs objected to (even if it be only for twenty-four hours) until it perhaps occurs to a butcher to ask the manager to produce one or other of them, that he may *eventually* obtain a second opinion. Should anyone mistrust the inspector, he must himself decree the time of the inspection, and attend it personally, in order to be able to advance his views.

The following new decree will shortly be added to the regulations for the inspection of meat in Stolp:

"Every *regular* tradesman must provide himself with a check, which bears on it a number fixed by the manager. This he must provide at his own expense. It must be given up to the manager by the tradesman or his assistant whenever *isolated portions are taken objection to*, and the owner *protests against the verdict given*. If he makes no protestation of this kind, or has not any checks at hand, the organs are destroyed *immediately*. The above method is to be pursued when entire animals are objected to."

[3]The business hours are regulated according to the requirements of the place; but there must be a change every four months, November to February, May to August, and March, April, September, and October.

As a rule slaughtering is forbidden on Sundays and holidays, However, it is recommended that in exceptional cases slaughter may be allowed after business hours by the payment of *double* dues (Bremen, Stolp), or additional dues (Crefeld, 5s. for oxen and pigs and 1s. for small beasts). The dues are raised twenty per cent. in Erlangen if light is required. Generally the daily business hours must not extend to more than ten, because otherwise the officials and staff will be too heavily worked. In a decree issued by the Royal Bavarian Government of Rheinpfalz the excessive extension of business hours is censured, for thereby the inspection by the officials

The animals must all be killed[1] *one hour before the slaughterhouse closes*, and the time must be settled in every case by the manager or his representative.

No one must remain on the slaughterhouse premises beyond the prescribed hours without obtaining permission from the manager every time.

Par. 2. *Admission.*

Admission to the slaughterhouse is only permitted to such persons as have business therein.[2]

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cannot be conducted with the necessary care, "for it is an unreasonable demand," says Ostertag, "that a slaughterhouse veterinary surgeon should be employed for more than ten hours per day. On reviewing the hours of business in various towns containing from 4,000 to 60,000 inhabitants, there is no doubt that the times fixed are arbitrary, *and in no way correspond to the needs of the place*, otherwise Rybruch (4,000 inhabitants) would not keep its doors open ten to eleven hours daily, and Brandenburg (39,000 inhabitants) three to four or three to five hours only every day.

"In the district of Posen it is decreed (15th June, 1896) that the inspection of the animals killed in the public slaughterhouse must *only* be undertaken *in daylight*. Exceptions to this rule are permitted when the slaughterhouse is fitted up with electric light, or such other equally effective artificial light, according to the ideas of the veterinary official. These officials are advised to take special heed to this decree."

A similar decree issued by the butchers' guild at Tilsit, that beef, veal, and mutton shall *only* be inspected *by daylight*, has been rejected by the magistrates there as impracticable, as in winter the time of inspection would be cut too short, and "it would be impossible to inspect the meat imported into the slaughterhouse and killed elsewhere before market time." But this regulation is put into practice in Landsberg, where imported meat is not inspected by artificial light.

In Hanover imported meat may only be inspected by daylight, or by electric arc lamps; horse-flesh by daylight *only*.

[1]The killing of animals *after the hour of closing* must be absolutely forbidden, so that sufficient time remains for further processes and cleaning up. Exceptions may be permitted by the manager.

In some slaughterhouses half an hour is considered sufficient for this, while in others (Brandenburg, Brunswick, Halle, Nordhausen) large beasts must be killed at least one and a half hours, and in others (Gotha, Forst, Hildesheim, Remscheid) two hours before the time of closing.

[2]In order to prevent the shocking number of thefts which took place in the slaughter-house at Leipzig, the following has been added to the "Cattle-yard and Slaughterhouse Regulations." Par. 92.:

Everyone who has business in the cattle-yard (cattle dealers, agents, salesmen), as well as those having to do with slaughter in the slaughterhouse (independent tradesmen, hired and house butchers, knackers, etc.), and *those employed in other businesses* within the slaughterhouse and the cattle-yard (hide and skin sellers, etc.), must *report themselves and their assistants to the management*, when there will be *handed out to them and their assistants permits entitling them to the right of entry into the cattle-yard and slaughterhouse. These permits* take the form of *dated checks*, and *must be presented on entrance.* They are available for one year.

If persons enter the cattle-yard or slaughterhouse without a permit they can be *turned out.*

The checks issued to masters are not *transferable*, and the checks issued for the *assistants* must *not* be given up to the *assistants of other masters.*

It must be reported to the management when *checks are lost*, and a fine of 3d. is imposed.

The *checks must be renewed* in the *month of January*, and *the old checks given up.*

The following useful regulations follow on the above:

1. All traders in the cattle-yard (dealers, agents, etc.), and all who slaughter in the slaughter-house (butchers, hired and house butchers, knacker, provision merchants and restaurant keepers who are also butchers and kill their own meat), and tradesmen who are otherwise occupied within the premises (skin and hide dealers, tallow melters, etc.), must all have in their possession round checks of white metal, bearing the inscription "*Municipal Cattle-yard and Slaughterhouse* of Leipzig," and each stamped with a different number.

Hired butchers[1] may be allowed entry by the manager on certain conditions, if they can prove their integrity and ability. The manager shall determine whether to allow them entry only after seeing their scale of charges.

Other persons must obtain the permission of the manager before admission can be granted them.[2]

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2. Provision merchants and restaurateurs who do not kill themselves, but have it done for them, require no special permit; *the slaughter ticket*, as a rule, suffices for such persons as a permit, if their names are attached to it.
3. Those persons who do not practise the calling of butchers, but have a permanent connection with the tradespeople in the slaughterhouse, or who *must* otherwise repair regularly to the cattle-yard or slaughterhouse in the interests of traffic, must be provided with tickets on which their names are inscribed, and to which is affixed the slaughterhouse stamp.
4. Persons who are only temporarily employed in the cattle-yard or slaughterhouse, and cattle dealers from other parts of the country who have their animals sold by agents, do not require a card of admission; it is sufficient for these to make a declaration of the purpose of their visit. In doubtful cases such persons can be referred to the manager. In the same manner those persons who bring in food for those busied in the cattle-yard and slaughterhouse require no permit.
5. All assistants employed in the cattle-yard or slaughterhouse (salesmen, office staff, cattle drivers, assistants, and such persons) must have in their possession an *angular check of white metal*, which is inscribed with "Municipal Cattle-yard and Slaughterhouse of Leipzig" and a number.
6. The permit checks and tickets issued by the management must be shown by all persons entering the cattle-yard and the slaughterhouse, and must be shown at other times on the demand of the slaughterhouse officials.

A second regulation concerns the *further checking of the slaughter tickets*. When a half beast is carried out the ticket is punched, and when the other half is taken away, or if a *whole* pig, calf, or sheep is carried out the ticket *must be given up*. By this means it is certain that no one can carry out *more* than he took in, as by the slaughterhouse regulations the meat must not be cut up in the slaughter-halls.

[1]Orders concerning the appointment of an official butcher.

Par 1. The corporation must appoint an official butcher, who must also act as the Freibank salesman.

Par. 2. This butcher is merely a tradesman employed permanently on the slaughterhouse, and as such a subordinate under the manager or his representative. He must implicitly carry out all instructions given in every case, and can be punished by the mayor for insubordination. He is engaged and dismissed on an eight days' notice, and must give the same to the municipality. If he disobeys any of the orders or regulations, he can be dismissed without notice.

Par. 3. This official may keep as many as three journeymen engaged, subject to the permission of the manager. He is answerable for the actions and omissions of these journeymen. The implements necessary for slaughter (knives, cleavers, saws, etc.) must be kept in order and under the charge of the butcher himself.

Par. 4. The butcher is obliged to kill all diseased or suspected animals, in so far as the owner of the animal does not look after this himself. He must be able to kill quickly and skilfully, and to supervise the labour in connection therewith, including carriage to the room for keeping meat which has been objected to.

Par. 5. The butcher may undertake private killings which are not urgent cases, if paid according to the scale charges. But official work must be dealt with before he can undertake any private commissions.

Par. 6. He must remain in the slaughterhouse during business hours, unless he has had permission from the manager to temporarily leave the work to one of his journeymen. A special room is assigned for his own use, which he must keep clean and properly heated, but he is forbidden to keep meat, blood, or such articles therein.

Tariff.—[2]In many slaughterhouses a small charge is levied on visitors who merely wish to see over the place, the money thus obtained being used for some benevolent purpose in connection with the establishment, such as the support of invalided journeymen butchers or of slaughterhouse labourers. In Danzig the entrance fee amounted to 3d. to 6d. (in the first few months £20 were received), in Apolda, Eisenach, Gotha (income, 1895, £7), Hagen, Riesa,

Par. 3. *Admission of Dogs and Carts, etc.*—Dogs may only be brought into the slaughterhouse harnessed as beasts of burden.

They must without exception be put up and secured in the place set aside for the purpose, and must on no account be allowed to run about the place.

Such dogs as are troublesome and give rise to disturbances must be removed by the parties who brought them, and must not be brought back again, should the manager give such orders.

All carts must be driven into the slaughterhouse court at a slow pace.

Waggons and carts are to be driven in and out according to the orders of the officials appointed.

The cleaning and washing of the butchers' carts and waggons is only to be permitted in the places assigned for this purpose.[1]

The carthorses belonging to the butchers may be put up in the slaughterhouse stables gratis[2], as far as room permits.

Par. 4. *The Conveyance of Cattle, etc.*[3]—The animals must not be driven in by dogs, nor must they be fastened to waggons.

Violence must not be exercised by means of leading ropes, etc.; blows with cudgels, kicks with the feet, pulling or pinching of the tail, are all forbidden. If small beasts are conveyed by means of waggons, these must be laid with straw. The hanging out of part of the body and every such means of discomfort must not be permitted.

Bulls must be led to the slaughter-hall with eyes covered and properly chained, by at least two strong fully-grown drivers (over sixteen years old), one of whom should lead the animal by the head,

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Naumburg, Weissenfels, 3d.; Oldenburg, Wiesbaden, 4d.; Oberhausen, Cologne, Werden, Zwickau (entrance ticket for the year 10s.), 6d.; Munich, Nürnberg, 2d. (in 1895 £90 were obtained); Leipzig, 3d. to 6d. (in the first half-year the number of visitors amounted to 13,500). In Hamburg and other places every constant visitor at the slaughterhouse must, as in Leipzig, be provided with a ticket of entry. In some large establishments, Munich for instance, there is a special man kept for taking strangers round the institution.

According to a decision of the Supreme Court the master of a butchers' guild may also be granted the right of entry, although he may have no special business in connection with the slaughtering, but he is responsible for the oversight of the journeymen and apprentices connected with the guild.

[1] *Waggon washing.*—In many slaughterhouses waggon washing is *forbidden.*

[2] In some towns a small charge is made for the stabling of horses (Munich, Hamburg 2d.; Cologne, 1d. for each horse), while in others an annual or monthly rent is paid; for instance, in Bremen the charge is 1s. a month for each horse stabled in the slaughterhouse.

[3] A special charge is made in some places if cattle are put up in the slaughterhouse at other than business hours. When many animals are brought in at once by one person a special agreement may be made for reduced rates.

the other meanwhile going behind the animal holding the chain fastened to his legs.[1]

Par. 5. Heated, tired out, or excited animals must not be slaughtered immediately.[2]

The slaughterhouse director will fix the time which must elapse before such animals can be slaughtered. Animals which have been conveyed a long distance by rail may only be slaughtered after having had a night's rest and proper feeding.

Exceptions to this rule may be permitted by the manager, if for any reason it is necessary to kill any of the animals immediately on arrival.

Milch-cows must be milked within twenty-four hours after their arrival.[3]

Par. 6. *Stabling the Animals.*—All animals brought into the slaughterhouse must be tied up. If the animals have not been already marked by the owner, his name must be put down on the slate[4] hanging in the lairage for the purpose, along with the number of the stall in which the animal is put up.

Par. 7. The manager does not give any guarantee for the safety of the animals.[5]

Par 8. Fodder and straw—or utensils or implements for providing the beasts with such—must not be brought in along with them, but are provided by the management, payment for which is to be made according to the tariff.

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[1]There are special laws concerning this subject.

[2]*The killing of tired animals.*—In Dessau during winter the animals must rest for eight hours if they come by foot, and four hours if they have come by rail. In summer they must rest for twelve hours if they come by foot, and six by rail.

[3]*On Milch-cows.*—Ostertag rightly warns people of the danger which may arise from the use of this milk, as it is often the means of carrying tuberculosis. In every case this milk must be regarded as a *suspected article of diet.* Ostertag recommends that special persons should be appointed to do the milking (not the cattledrivers and slaughterhouse labourers), to destroy the milk of badly fed and diseased animals, and to boil the remainder of the milk before selling it. The receipts from this should be placed to the credit of a sick fund or other benefit. According to Duncker, about two hundred gallons of milk were obtained weekly in the cattle-yard and slaughterhouse of Berlin, which was previously offered for sale without any restrictions. But, on *Hertwig's* suggestion, this is now sterilised in the Rohrbeck apparatus in vessels each containing about four gallons.

In Cologne this milk is used in the restaurant of the cattle-yard there.

[4]Compare Chapter VI.

[5]Although this order is contained in all slaughterhouse regulations, still its validity is very questionable, for the Court of Justice in Cassel decided on 4th October, 1894, that the slaughterhouse management have all the rights of a *livery stable keeper*, and therefore must undertake all the *responsibilities*, and, further, as the use of the slaughterhouse is compulsory, the management should *pay damages for stolen animals.*

In various slaughterhouses the animals are insured in case of fire (Hamburg, Cologne, Gleiwitz).

Animals, which are put up for longer than twenty-four hours, must be sufficiently fed.[1] The fodder is to be given them, according to the rules already laid down, by the employees of the owner or by the slaughter-house workmen (by order of the manager) at the owner's expense.

Par. 9. Animals once put up in the slaughterhouse stables must not be again removed.[2]

Par. 10. *Use of the Slaughter-halls.*—The animal to be slaughtered must not be led into the slaughter-halls until preparations have been made for immediate slaughter, the dues required by the tariff have been paid, and the receipt for the dues paid has been given up to the hall-master.[3]

Par. 11. *Killing the Animals.*—Slaughter must take place according to rules, with every caution and in the quickest possible way.

All animals which are not to be killed according to the Jewish rites, must be thoroughly stupefied before blood is drawn,[4] and for large animals at least two persons must be engaged. Young or

[1] Large beasts are usually fed twice a day, other animals once. The quantities of fodder given in the different slaughterhouses and cattle-yards vary. It is usual to give large beasts 12 lbs hay daily, and sheep, etc. 3 to 2 lbs. Pigs get 2 to 3 lbs. boiled potatoes, bruised barley, fodder meal (both scalded with hot water) or maize, while calves are fed on thin gruel or skim milk. For large beasts one bundle (12 lbs.) of straw is reckoned, and the same for every small pen of small beasts and pigs. The price of fodder is arranged according to market rates, and is made known by placards which are changed every quarter. It is usual to impose a duty of 20 to 33⅓ per cent. for looking after, weighing, etc., of the fodder. If the animals are fed by the slaughterhouse staff, a special charge is made for services—one penny for each large beast, or a half-penny for each small beast and pig daily. The owner has, then, nothing to trouble about. If the cattle owners choose they can, on the previous presentation of fodder checks, have a greater quantity of fodder meted out to their beasts than the fodder regulation prescribes.

[2] In the opinion of veterinary officials animals brought into the slaughterhouse should not be allowed to go out again without permission of the police. This permission must only be accorded when the animals are to be conveyed by rail to another slaughterhouse under regular veterinary and police supervision. In contradiction of this we have the following decision of the Supreme Court of 28th December, 1893: "Par. 2, abstract 1 of the law of 9th March, 1881, decrees that all animals entering the public slaughterhouse must be submitted to inspection both before and after slaughter for the assurance of their state of health. The regulation that all animals for slaughter entering the slaughterhouse *must also be killed there, cannot* be altered by a magisterial decree."

[3] In Halle, Gotha, and Bromberg the following noticeable rule is laid down: "If an animal is killed before the slaughter ticket is given up, the butcher or his employees must pay into the *slaughterhouse funds a fine four times the amount of the slaughterhouse dues*, outside of any fine or punishment imposed by the police. In Forst the amount is fivefold.

[4] In Hamburg calves are not stupefied, because *calves' heads* are scalded and then made into "mock-turtle," a much valued article of food in that town, but which cannot be obtained if the cranium is pierced through. The author has found by careful experiment that there is only an inconsiderable dark spot seen on the outer side of the calves' heads after scalding, just at the place where the blow fell, if this blow is given exactly on the occiput bone (between the ears); the blood then runs off under the skin. But this ought not to be a reason why thousands of animals are subjected to unnecessary torment in a perfectly unjustifiable manner. One can say truly with *Jean Paul*, "Good heavens! how many hours of martyrdom animals must suffer that mankind may have a single moment's gratification of the palate!"

weakly persons must not be permitted to officiate at the stupefaction (or killing) of oxen or pigs.

Par. 12. The killing or stupefaction of large cattle (oxen, horses) must be proceeded with by means of masks (fig. 128, page 287); that of pigs, calves, sheep, and goats by means of clubs, or else by the pig-killer or the bolt driving hammer for small beasts.[1]

Par. 13. The skinning, scalding, and further treatment of the carcases must not be begun until death is certain, and no movement or twitching of the body can be observed. Calves, sheep, and goats must not be hung up until they are *perfectly* motionless.

Par. 14. *Jewish Method.*—For the prevention of unnecessary cruelty to animals by the Jewish method of slaughter, the following must be observed :

1. The animals must be thrown by means of windlasses or similar contrivances. For this at least three grown men are necessary. The windlasses and the ropes, etc., used for this shall be durable, and must always be kept in good order, so that they can be worked without needless delay.
2. While the animal is lying down, its head must be properly supported and guided, so that it does not knock against the ground nor the horns get broken.
3. The killer must be *present* at the throwing of the animal, and must be ready to perform his task directly it is thrown. The latter must be done surely and quickly.
4. The head of the animal must be made and kept fast, not only during the act of slaughter, but also during the whole time during which muscular cramp is taking place after the cutting

[1] In the regulation put in force on the 1st October, 1892, by the Royal Saxon Ministry the following is decreed respecting animals for slaughter:

(1.) In the slaughter of all animals, with the exception of birds, *blood-drawing must be preceded by stupefaction.* Exceptions are made where slaughter is rendered necessary by accident and sudden illnesses, if stupefaction cannot be carried out owing to the circumstances of the case. (2.) Oxen shall be stunned by means of the slaughter mask, except in so far as the development of the skull renders this impossible. (3.) Regarding the stunning of pigs, calves, and sheep by the brow or nape blow, the butchers can make their own choice; but it is recommended that wooden clubs be used for calves, the bolt apparatus for sheep, and the bolt-driving hammer for pigs. (4.) All slaughters, with the exception of emergency slaughters, must take place at the responsibility of the butchers, and only by thoroughly competent persons, or under the control and assistance of such, and never by apprentices. (5.) All slaughters must be carried on in closed buildings, not to be entered by the public. The presence of persons *under sixteen years* at slaughters is forbidden, unless these are apprentices or assistants. (6.) Regulations regarding punishments.

General decrees regarding slaughter are issued in:

(1.) Prussia. Min. Decree of 16th December, 1889, and 25th March, 1890. Under this decree special police regulations have been issued in the various Government districts.

(2.) Bavaria. Min. Decree of 19th February, 1890.

of the jugular vein, as otherwise the head is likely to be violently jerked about, and beats against the ground, especially when the horns have been damaged.

5. Killing must only be carried out by a certified skilled man.

Par. 15. This treats of the prohibition to kill immature calves.[1]

Par. 16. *Treatment of the Carcase.*—The inflating[2] of calves, sheep, and goats, or of meat of *any kind* is forbidden.

Metal skewers must not be used for fixing the fat, etc., to the meat.

Par. 17. All carcases must be immediately prepared after they have been bled and the work must go on without interruption.

The entrails must not be opened in either the slaughter-hall or the scalding-room, but this must be done and their contents emptied in the place set aside for the purpose (manure-house).

The hairs and bristles obtained by scalding, also the hoofs of the oxen, are the property of the slaughterhouse, and can be made use of for the good of the slaughterhouse exchequer.[3]

Any object of scientific interest found in the bodies of the animals is to be preserved and added to the collection in the slaughterhouse of such articles.

[1] Prussian Min. Decree, 14th January, 1889. In Bavaria, Baden, Saxe-Meiningen, the Ministerial Decrees all contain regulations concerning the methods to be adopted in this mode of killing.

Each place has a different order on this subject, but three points are to be taken into consideration in giving a verdict: The age (teeth and condition of the gums), the weight, and condition of the navel. They must be at least eight days old, well nourished, and the navel must be closed. The nominal weight of the live body is about 100 lbs. on an average.

In the Act concerning the traffic in articles of diet (14th May, 1879) calves less than eight of ten days old are considered "immature" and of "little value as nourishment."

Special regulations as to the killing of calves are enforced in some parts of the country. In Hesse-Nassau calves must not be killed unless they have eight teeth (incisors); in Sachsen (Altenburg) unless they are four days old; in Ober-Elsass unless they are twenty days old; in the Duchy of Coburg unless they are three weeks old; in Lorraine unless they weigh 1 cwt., etc., etc.

According to a decree put into force on 1st April, 1898, and issued by the Chairman of the Government of West Prussia, all calves not fourteen days old must be sold in the Freibank.

[2] According to a decision of the Imperial Court (27th May, 1887) *inflated* meat is regarded as *damaged*, and must not be sold, as it has been proved that it has frequently caused nausea when eaten.

According to a decision of the Supreme Court of 5th January, 1888, police regulations which forbid inflating are valid.

[3] According to a decision of the Imperial Court at N. this command is not valid (regarding the use to which hoofs, bristles, etc., are put), as the portions left behind after slaughter are *res nullius*.

In Erfurt £18 in 1896, and £25 in 1897, was the amount obtained for bristles falling to the slaughterhouse funds. This sum was added to the "Recreation Fund" of the butchers' guild.

In Cottbus £20 was obtained for bristles in 1894; in Stolp only about £1 10s. to £2 annually is got for bristles. This sum goes to the slaughterhouse treasury. In Zwickau there is an arrangement by which a tenant pays £5 annually for bristles; in Forst another pays 10s. annually, etc., etc.

Blood.—The blood which flows out at killing must be caught in vessels kept in the slaughterhouse for that purpose, so that the floor may be as little soiled as possible. Neither the contents of the bowels nor the blood must be taken away out of the slaughterhouse. An exception is made for blood required for sausage making, if it is carried away in thoroughly air-tight and clean receptacles.

The following must not be used as human food, and are unconditionally retained in the slaughterhouse:

1. The blood of such animals whose throats are cut, and [1] the blood of all animals killed according to Jewish rites, also that of calves, sheep, and goats slaughtered by being stabbed in the neck.
2. The blood of such animals, as on inspection have been found to be suffering from a disease of the lungs, tuberculosis, red murrain, or any other similar contagious disease, and are taken objection to; also when the meat is found unsuitable for human consumption. The blood must not be removed from the place of slaughter until the result of the veterinary inspection has been announced. The blood found fit for use must be removed from the slaughterhouse immediately after the slaughter of the animal, otherwise the manager is justified in otherwise disposing of it.[2]

Par. 18. Only hand-barrows belonging to the premises must be used within the precincts of the slaughter-halls and other buildings. The connecting passages must be kept clear of everything, so as to allow freedom of traffic. After the meat is prepared, neither hides, entrails, fat, feet, or other refuse must be left about

[1] The blood flowing off from the incision at the neck is nauseous because of its uncleanness, the contents of the stomach usually rushing out at the same time, and mingling with it. In the kingdom of Bavaria the use of such blood was forbidden in the year 1896.

In the slaughterhouse regulations at Wiesbaden it is decreed that when the neck is cut "the throat of the animal shall be held together with a fork, so that none of the contents of the stomach gets into the blood." "The forks or implements to be used are to be supplied by the slaughterhouse management."

[2] In Naumberg another sentence is added to this paragraph, stating that only as much blood must be taken away by the butcher as he really requires for sausage-making.

In Hildesheim only *pigs' blood* can be taken away. For this also payment must be made according to the tariff (½d. the litre), and this rule holds good in various other towns.

In Gotha one litre of blood may be taken away free for every animal killed; if more is taken ½d. a litre is charged.

In various slaughterhouse regulations it is stipulated that the blood for sausage-making must not be touched by the hands, but with a stick or whisk. Blood-stirring machines are a good substitute for both.

A suitable blood-stirring appliance for any blood consists of a conically-shaped spiral. If this spiral is worked up and down several times the particles of fibrin adhere to the wires or collect on the perforated sieve at the bottom.

in the slaughterhouse. The meat itself may remain hanging in the halls until the evening of the day on which it is killed.[1] Hides should be placed one over the other, and rolled up tidily in the place and on the spot where the animal has been skinned.

Par. 19. Unborn animals and useless parts of meat of every kind, such as diseased lungs, livers, etc., must be cut into small pieces before they are put into the receptacles for the purpose. The unborn animals may be skinned, but should be destroyed to prevent the possibility of spreading some contagious disease.

Par. 20. Butchers or journeymen who, during or after slaughter, discover that an animal or a part thereof is diseased, must report the same to the manager or his representative directly.

It is forbidden to remove animals that have been objected to, or portions thereof, out of the slaughterhouse, or the room for keeping such meat, without the permission of the manager.

Par. 21. *General Orders.*—Everyone who uses the slaughter-house must observe the greatest cleanliness in all his work; he must take away immediately all refuse, scraps of meat, hair, etc., to the places provided for the purpose, and he must clean the floors, tables, and walls, as well as all the utensils he has used, before he leaves the place.

There must not be any interference with the work of the slaughterhouse, and neither noise, quarrelling, singing, nor whistling will be allowed within the building or in the yard. Neither must there be any writing on or soiling of the walls, or littering of pieces of paper in the halls or in the court.

Cigars or tobacco pipes must not be carried in the mouth or the hand, whether they be burning or not, either in the slaughter-rooms or stalls, or in the courtyard.[2]

Par. 22. Clothes or other articles not required in slaughtering must not be laid down or hung up in the slaughtering rooms. Undressing must only take place in the rooms set aside for that purpose.

Blood or such animal products must not be kept in the latter rooms. The cupboards provided by the management must only be used for keeping dry and clean articles, and must always be tidy.

[1] In Cologne the animals when slaughtered may be allowed to hang in the hall of the cooling-house at a charge of 6d. for every twenty-four hours from the day after the slaughter. If hung a considerable time a charge of 1s. is made for each animal.

[2] According to experiments made in Paris, tobacco smoke was found to have a bad effect on the meat.

All articles which are found on the premises must be handed over *immediately* to the hall-master or to the office.

Par. 23. The lighting and extinguishing of the gas, the handling of the arrangements for ventilation, and the management of the steam and water-pipes leading to the scalding tank, must be under the control and subject to the orders of the slaughterhouse officials alone, and every unauthorised party is forbidden to touch them.

The water-taps must only be turned on when drinking water or water for cleansing is required, and must be immediately turned off after use. All waste of steam and water is absolutely forbidden. In the use of the machines and utensils necessary for slaughtering purposes it is made a matter of the strictest duty that proper care should be taken of them.

The utensils belonging to the slaughterhouse must not be taken away, nor must they be removed from the hall for which they are intended.

Par. 24.[1] No person is allowed to enter the stalls, lofts, or fodder stores with a naked light.

Par. 25. The conveyance of meat[2] out of the slaughterhouse into the town and *vice versa* must be by means of covered waggons or carts. This rule holds good for meat still in hides, for all sorts of refuse, hides, etc. If the waggons or carts have not closely fitting covered roofs, the meat must be covered over with clean cloths. The waggons or carts used for the carriage of the meat must always be thoroughly clean; the sides and bottom, as well as the wooden frames for laying the meat on, must in particular be free from blood, fat, and dirt.[3]

Carts for the carriage of dead meat must not be used for the transport of living animals.

Par. 26. The municipality gives no security to the butcher for the safety of his meat, skins, or utensils left in the slaughterhouse.

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[1] If there are no special cold store regulations, the necessary paragraphs can be inserted here.

[2] In Crefeld a police regulation of 1892 decrees that persons who carry pieces of meat out of the slaughterhouse into the transport waggons, or out of these into the shops, etc., must have a cap covering both head and neck. In Guben the slaughterhouse regulation prescribes that "those persons who are engaged in the yard or in the rooms of the slaughterhouse in carrying slaughtered beasts or pieces of meat must be covered with a clean cloth on those parts of the body that come in contact with the meat."

[3] Compare the police orders of Schmalkalden, of 1st September, 1896. This also orders that neither refuse, old tallow, nor suet, hides, etc., may be conveyed on the same waggon or cart simultaneously with the meat.

No one should be allowed to sit on the meat.

But the officials are expected to guard against thieving and exchanging as far as possible.

Par. 27. Every master butcher, journeyman, apprentice, and assistant, and, indeed, everyone who makes use of the slaughterhouse premises must render *unconditional* obedience to the slaughterhouse manager and the superintending staff of officials.

The manager—or his representative—is authorised to refuse entry to, and have removed, all drunken persons, and any person who will not carry out his orders.[1]

Complaints against the staff must be made to the manager, and complaints against the latter must be made to the mayor, within twenty-four hours after the offence.

Par. 28. All persons violating any of these regulations can be expelled from the slaughterhouse, and will be punished according to the general laws with a fine as high as 30s., or a corresponding term of imprisonment.[2]

4. POLICE REGULATIONS CONCERNING THE INSPECTION OF PIGS (AND WILD BOARS[3]) KILLED IN THE MUNICIPAL SLAUGHTERHOUSE, AND SUBJECT TO INSPECTION FOR TRICHINOSIS (TRICHINOSIS INSPECTION REGULATION).

By virtue of pars. 5, 6, and 15 of the Act 11th March, 1850, and with regard to par. 8 of the regulation for the inspection of meat killed in the slaughterhouse, and par. 1 as to fresh meat imported from elsewhere, the following police regulation has been issued with the consent of the magistrates.

Par. 1. The inspection of the slaughtered pigs for trichinosis must be made immediately after killing, and as soon as this is accomplished those engaged in the work must give notice at once to the proper official.

Par. 2. The pigs slaughtered must not be taken away out of the slaughter-hall, nor cut up into pieces, before they have been

[1] In Hamburg it is a rule that the manager can refuse admittance for three months to such persons as have been expelled three times from the slaughterhouse within a year.

[2] Compare the introduction to this chapter. In Barmen the slaughterhouse manager is entitled, by par. 13 of the Trades Regulations, to impose fines of from 1s. to 5s., in Leipzig from 1s. to 3s. In Gera he has a like authority. It would appear advisable, however, for these to be imposed by the magistrates alone.

[3] Compare further on the inspection of wild boars. As dogs also can be afflicted with muscular trichinosis, it is considered necessary that where dogs are permitted to be used for human consumption, they should be subjected to inspection for trichinæ.

An inspection of this kind is arranged for in the slaughterhouse at Chemnitz, as trichinæ have been discovered in a dog killed there.

In Dresden *bears' meat* is inspected for trichinæ.

subjected to an inspection according to the rules laid down in this regulation, and no part is exempted from stamping.

The pig may be cut open, but the two halves must remain connected at the neck part of the back. The entrails can be taken out, but must be kept in the immediate neighbourhood of the pig they belong to, so that no exchange is possible. It is only after stamping is completed that the owner is permitted to dispose of the carcase.

Par. 3. After slaughter the official instructed to take specimens must remove with a knife, specially made for the purpose, the pieces necessary for inspection, namely, a piece from—(1.) The diaphragm "pillars." (2.) The diaphragm. (3.) The muscles of the tongue (4.) The muscles of the larynx.[1] These pieces must be placed in one of the little specimen-boxes belonging to the office,[2] the pig and the most important parts of the interior organs must be marked with the number of the specimen-box,[3] and an entry made in the proper book (Form A, page 305). The specimen-box is then taken to the trichinosis inspection room.

Par. 4. The specimen pieces and book must be handed over to the official in charge of the inspecting office, who must fill in the matter under headings 1 to 7 in the register book (Form B), according to the specimen-taker's book, and hand over the specimens to a trichinosis inspector for microscopic examination.

The trichinosis inspector, who gets his orders from the inspecting office superintendent, then cuts six specimens from each of the four pieces given to him, and examines these carefully and conscientiously.[4]

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[1] In many trichinosis regulations other parts of the body are also ordered to have pieces cut from them—as the muscles of the neck, the belly, and between the ribs; but it is stated by various authorities that to take samples from parts other than those places mentioned in par. 3 is not only irrational but dangerous. Thirty or thirty-six tests are often made (in some places twenty-four), and in Stettin often as many as fifty.

[2] Instead of the usual tin boxes, about 1⅜in. diameter and 1¼in. deep, open shallow vessels are sometimes used, but these are not recommended if they have no lid. The former can be put into a large tin box which holds about ten to twenty of the smaller boxes, and can thus be taken safely and conveniently to the inspecting office). Little *paper bags*, with numbers marked thereon, are absolutely useless.

[3] This mark is best made with pen and ink or a number-stamp on the hind feet. It is not advisable to fix the checks to the hams by means of iron skewers.

[4] It may be advisable that the tests should be examined by a second inspector to make sure that nothing is overlooked.

No inspector should deal with the pieces from more than twenty pigs in one day. Twenty minutes are usually allowed for each pig. In Bromberg thirty minutes are not only allowed for each inspection, but must be taken. In Stettin and Stolp twenty minutes are assumed to be sufficient, while in Stettin an inspector must not work for more than six hours daily. At the utmost he can only work for seven hours during two days in one week, and this should only occur if there is an unusual amount of work to be done.

Par. 5. If, on inspection, no trichinæ or other diseased conditions are visible under a microscope, the inspector must communicate this to the superintendent, who will enter the fact into the office register under the headings 8 to 10, and under the heading 5 in the specimen-taker's book he will state that the animal is "free from trichinosis," and affix his signature. The specimen-taker can then stamp each half of the pig on the head, shoulders, back, belly, the inner surface of the legs, and in the breast, on the third, seventh, and tenth ribs with the words "trichinæ free" or "inspected," or with the letters signifying that it has passed through some slaughterhouse. (See figs. 106, 142, and 143.)

Fig. 142.

Fig. 143.

Par. 6. If the trichinosis inspector finds on examination that the meat contains trichinæ[1] he must report this to the slaughterhouse manager, at the same time submitting to him the piece of pork containing trichinæ and the pieces of meat still contained in the box.

If the slaughterhouse manager is assured of the presence of trichinæ, the pig is ordered to be removed from the slaughter-hall after being stamped "Containing trichinæ," and the police are notified. If the manager finds that the inspector is mistaken, matters proceed as in par. 5.

If the inspection takes a considerable time, the specimen-taker must meanwhile put a ticket on the pig indicating that it is not passed yet.

Par. 7. Every inspection must be completed on the same day

In the district of Dantzig there is a decree stipulating that the trichinosis inspectors must not make *more* than twenty inspections in one day, and they must take fifteen minutes at least to each, while in the kingdom of Saxony and the Reg.-Biz. of Trier and Cologne not *more* than ten inspections must be made daily, and in the Duchy of Gotha sixteen is the number allowed.

[1] In some places the trichinosis inspectors receive premiums for the discovery of trichinosis, amounting in Grünberg to 10s., Kolberg 15s., Lunenberg £1, etc. This is paid out of an insurance fund or from money raised by subscription, as in Myslowitz, where sixpence per month is contributed, to give five shillings for every discovery.

Johne comments on the premiums given to trichinosis inspectors as follows : "It is a very open question as to whether or not premiums should be given by the police to the inspectors for finding trichinæ. Objection has been taken *against* such rewards being given for what is a simple duty to a careful and conscientious inspector. But if one considers how troublesome and monotonous the calling of the trichinosis inspector is if carried on for years, then one will regard the offering of a prize as an advisable inducement for the maintenance of carefulness. The premium offered must not be *too low* if it is to fulfil its purpose." Ostertag, however, does not share this opinion, for he considers no such inducement should be required.

on which the tests are taken from the pigs. The tests remain at the disposal of the management.[1]

Par. 8. When trichinæ, blotches, etc., are discovered, the superintendent of the inspecting office must report it to the manager immediately.[2]

All microscopic preparations in which the existence of trichinosis is conclusively proved, should be cemented or puttied and kept in the trichinosis office for two months, after which it will be quite safe to remove them.

Par. 9. The slaughterhouse manager is obliged to keep a strict and constant watch on the capability of the inspectors, and to submit their preparations as often as possible to a microscopic test.

Neither the superintendent of the inspecting office nor the specimen-taker is allowed to communicate to the trichinosis inspectors the origin of the meat to be inspected.

The superintendents, the trichinosis inspectors, and the specimen-takers are strictly prohibited from making any independent inspections of meat.

Par. 10. Superintendents, inspectors, and specimen-takers must undergo a course of training under a slaughterhouse director, and submit to the examination prescribed by the veterinary officer of the district[3] before they can be appointed.

Par. 11. The same rules hold good for the microscopic inspection of pigs killed elsewhere than in the slaughterhouse, and for wild boars killed in the slaughterhouse.

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[1]In Berlin, during 1891-2, £215 were obtained by the sale of the specimen pieces from 560,000 pigs, and was invested at interest. The sum at the present time amounts to about £2,200. In Gotha 2d. per lb. is obtained (about £10 annually). In Potsdam it was previously sold as dogs' food, now it is burnt.

[2]The president of the district of Bromberg has decided that the supervision of trichinous pigs be undertaken not by the district veterinary surgeon but by the slaughterhouse manager.

[3]In most of the Government districts, the examining, checking, and second examining are done by a medical man (Government medical adviser and district physician) *belonging* to the examining commission. In the district of Bromberg the test regulations for "meat inspection" (trichinosis inspection) of 16th June, 1894, say that the examination must be undertaken by the official *physicians* or veterinary surgeons *With the exception of those public slaughterhouses under perpetual veterinary control*, all trichinosis inspectors who have been appointed after an examination must go through a furthur examination every three years.

A similar order is in force in the district of Frankfurt. The magistrates are authorised by the ministerial rescript of 20th January, 1895, to order an examination every two years, and those meat inspectors who are not absolutely cert in in discovering trichinæ, or whose microscopes are found in a careless and untidy state, are to be examined *at their own expense* until they meet with the requirements of the examiners. The expenses of these examinations are not to be drawn from the State Exchequer but to be paid from the funds required for the salaries of the employees, etc.

A.

Specimen-taker's Book.

1	2	3	4	5	6
No. and date.	Name of owner of pig.	Specimen-taker's marking of pig.	Name of inspector responsible.	Name of superintendent.	Remarks.

B.

Register of the Trichinosis-inspecting Office.

1	2	3	4	5	6	7	8	9	10
No.	Day and hour of the completion of inspection.	Name of owner of pig.	Mark made on pig by specimen-taker.	Hour of specimen taking.	Name of specimen-taker.	Name of trichinosis inspector responsible	Name of Superintendent.	Trichinosis free.	Remarks.

Par. 12. If there is any contravention of the orders of these regulations, the offender will be fined unless he comes within the punishment under the general laws.

Par. 13. These police regulations come into force on the day the slaughterhouse is opened.

5. POLICE REGULATIONS FOR THE INSPECTION OF FRESH MEAT KILLED ELSEWHERE AND BROUGHT INTO THE SLAUGHTERHOUSE.

Par. 1. The inspection of fresh meat[1] brought in from else-

[1] According to a sentence passed by the Supreme Court, June 12th, 1890, a local police order is not considered valid which prohibits the delivery of *fresh meat ordered* from butchers in other parishes, etc., until it has been previously inspected in the municipal slaughterhouse, and has been taxed according to the usual rate of dues fixed in the tariff.

This sentence is borne out by a later decision of the same law-court, 28th October, 1895. An obligation to inspect fresh meat killed elsewhere than in the town and then brought within its bounds only holds good when it is "offered for sale," but not when it has been *previously* ordered, and thus is already *sold* before importation.

In opposition to this verdict, we find a contrary decision of the Imperial Court on the 17th January, 1889. A slaughterhouse regulation cannot override the law by demanding an inspection of meat brought into the slaughterhouse unaccompanied by an order for compulsory inspection. The law makes no distinction between meat which is ordered and *that which is not*; it does not allow the former to go free, and the decree that ordered meat is also subject to inspection is not contrary to this law. While the regulation not only releases the consumers from inspection, but also the importer who is forthwith entitled by law to deliver meat, it falls short of the requirements of the law as given in the closing sentence of par. 2, Nos. 2 and 3, covering all meat offered to the public for sale, especially that *ordered* by a restaurant owner, only relieving that *imported from elsewhere* for *private use*, because the probable injury caused by the omission of inspection only touches the importer alone. Also, meat which is ordered from butchers who trade elsewhere than within the town boundaries is by this law "*offered for sale*" to the giver of the order, for this expression is not limited to meat offered for sale publicly, but comprises every mode of making it accessible for sale by preparation into that form which renders it most suitable for the market. Therefore, meat is *offered* for sale to the giver of the order, even should he only receive one single piece of meat. The decision of the Supreme Court of 20th January, 1898, is in keeping with this.

where[1] is carried out in the municipal slaughterhouse (or in the inspection stations[2] erected for this purpose) by the expert appointed for this duty by the local magistrates. The inspection for trichinosis is carried out according to the special orders issued with relation to that disease.

Par. 2. The inspection extends to oxen, horses, asses, mules, pigs, including sucking pigs, but not wild boars[3], calves[4], sheep, goats, and lambs, oxen and horses being quartered[5], pigs halved, and other animals to remain whole. If several pigs are brought in at once, the halves belonging to each other must be recognisable as such by marks or incisions of some kind.

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[1] "*Fresh meat*" in the sense of par. 2 of the law of March 18th, 1868, and March 9th, 1881, is not merely freshly killed, but also all meat in a fresh condition (such as fresh roast beef), in opposition to dried, pickled, or smoked meat, or meat treated with any preservative to prevent it going bad quickly. According to a decision of the same court (April 20th, 1893), meat *salted on the surface only* is to be understood as coming under the head of "*fresh meat*," for by this treatment only the "*outer surface*" is affected, the inner part being completely untouched and perfectly fresh. The results of salting can easily be removed again by laying the meat to soak in water.

According to a later decision of the same court (1894), *fresh pork* and *fresh fat* (as distinct from dried pork or smoked bacon or rendered lard) are to be regarded undoubtedly as "fresh meat," and if imported from elsewhere, are subject to compulsory inspection. According to a decision of the Supreme Court of July 15th, 1898, fresh "seam" must be considered as "fresh meat," and is liable to inspection *before* importation into any district.

Ostertag holds that livers imported from Denmark and Hamburg "syringed" with salt or boracic acid should be submitted to inspection in inland countries, as they are really "fresh meat," just like that which has only been sprinkled with salt, and American pork which is not pickled and American beef only *pickled on the surface*. For by such manipulations the meat in question is still only of a perishable nature, and therefore comes under the heading of "fresh meat."

It was resolved in Westphalia in 1893 to suggest to the Government an alteration of the slaughterhouse law, in order to prevent, if possible, an evasion of the same, particularly of par. 2, clauses 2 and 6.

[2] According to the regulations, meat must be exclusively inspected in the inspection station alone, and always *before* the depositing of the meat in a place of sale, and depositing must be understood not only to be the placing of the meat in the actual place of sale, but also in the precincts thereof, or any place in direct connection therewith in so far as the meat is there for the purpose of offering it for sale. "A statement that this meat is thus already actually offered for sale, is thus unnecessary."

[3] The inspection of *wild boars* is also ordered in many districts.

[4] In making stipulation as to the age of calves it is to be borne in mind that these when killed (without hide or head) lose about two-thirds of their live weight.

[5] According to a sentence of the Supreme Court of 24th May, 1894, the following local regulations must be considered as *legally binding in every particular*: The meat of oxen and horses entering the slaughterhouse for inspection must be exposed in quarters at least, that of pigs at least in halves, and that of other animals in an undivided condition; and the principal parts of the interior (heart, liver, lungs) must of course be connected with the animal as in its actual state, the heads of horses being also exposed for examination, and tongues of all animals separately. The court considered that this regulation is supported by par. 2, clause 2, of the law of March 9th, 1881, according to which it may be ordered that the meat shall be submitted to inspection in pieces of a considerable size, large beasts only halved or quartered and small beasts not cut up at all. It is not apparent why the local regulation should have to make limitations as to the exposure of pieces of "considerable size," as the meaning of the law is that each regulation should define the precise dimensions of these pieces. The law of March 9th, 1881, was made expressly for the purpose of protecting the public against the consumption of unsound meat, and thus leaves it to the regulations to ordain those orders for the inspection of meat which appear necessary or serviceable for the attainment of this end, and also by all means to subject the importation o

Par. 3. The lungs, liver, and head (with tongue) of each animal must, *in every case*, be exposed for inspection along with the animal to which they belong; also the kidneys and genital and internal organs must not be detached from the usual position in the body of the animals.[1]

Par. 4. Notice must be given either by a voucher[2] from the local police magistrates, from an approved veterinary surgeon, or

fresh meat killed elsewhere to a certain limit. If then the regulation makes it appear that the meat of oxen and horses exposed for inspection in quarters or pieces of considerable size must include also the principal organs bound up with the animal as in its natural condition, then such a regulation must be considered in consonance with the law, as it has without doubt been issued in the interests of the public.

If it is not possible for those persons who wish to offer for sale fresh meat not killed in the slaughterhouse to expose the quarters or large pieces of oxen, etc., with the principal organs adhering to them, as in its natural condition, or if they wish to offer parts of the animal with which the principal organs are not connected, then there is nothing left for these persons to do but *to abstain from offering such meat for sale.* This restriction in the carrying on of the trade infringes on none of the rights allowed in par. 42 of the Trades Statute regarding trade with other places.

[1]It is recommended that single roasting joints, hams, legs, fillets, etc., and also *sausage meat*, be *entirely* excluded from importation, as is done in a great many towns. *Sausage meat* especially is *wholly* excluded from importation in many towns. In Potsdam and Halle the importation of such meat is forbidden.

The order to leave the pluck (lungs, liver, and heart) unseparated from the meat is carried out in quite a number of towns without any difficulty in the case of large animals, although it must cause great inconvenience to the butchers; while, on the other hand, the requirement is doubtless easily complied with in the case of small beasts. According to our opinion, it is sufficient to demand that *kidneys* and *sweetbread* should always be left adhering to the meat, and that the *pluck* should *invariably* be exposed for inspection along with the meat.

With regard to this order, the following decision was made by the Supreme Court on the 26th January, 1893: "Offering for sale in the sense of the law of March 3rd, 1881, and also the 'site' in the sense of the slaughter house regulations of the town of X, includes not merely the public exposal for sale, but also even preparing or making accessible for sale, by the preparation in that form, which makes it suitable for the market. The laws concerning the erection of public slaughterhouses (as well as the corporation regulations of April 25th, 1891, the decree of Dec. 30th, 1891, included in these) are issued in the interests of public health, and are particularly designed to protect everyone from the consumption of unsound meat. If, therefore, par. 3 decrees that the lungs, heart, liver, sweetbread, and kidneys of the animal exposed for inspection in the slaughterhouse must not be separated from the meat thereof, *this order must be carried out unconditionally*, as being issued in the interests of the health of the buyer, unless an exception be made for special reasons, for thus alone can the purposes be attained for which they were intended.

Nothing therefore, can be done, and sellers must send along with the meat the organs that should naturally adhere to it when it is being exposed for inspection. This is not an impossibility, and even if in individual cases a certain part need not be accompanied by the organs belonging to it, this could not be said to release the rigours of the law as a general rule. In such cases all claims would have to be relinquished as to the kind of meat. But par. 3 of the regulations does not contain an order contrary to the principles of the trades statutes.

But the demand which the magistrates of T. purposed making, that the *whole* of the inward parts of the oxen should be exposed for inspection adhering to the meat as in its natural condition, when such meat has been killed elsewhere than in the public slaughterhouse, is thoroughly impracticable, for it would be impossible to clean all the inner parts of the animal without disconnecting them, and it is evident that they cannot remain uncleansed any length of time.

[2]*The voucher.*—Instead of this it can also be decreed that the seller exhibits to the buyers a certificate authenticated by the local magistrates, stating that he sold the animal when alive and without any perceptible sign of disease about it, for in districts where there is no meat or trichinosis inspection it is not so easy to get a certificate from a person empowered by the police, or even a veterinary surgeon, for a special inspection. According to a command of the Minister of the Interior, such certificates, given by municipal and official and such inspectors, are not *obliged to be stamped.*

from a qualified meat inspector[1], or by the stamp of a slaughterhouse under public control, that the meat exposed for inspection comes from an animal which has undergone an examination before slaughter, and was not found to be suffering from any recognisable disease.

Par. 5. It is forbidden that any *diseased parts whatever* should be removed by anyone before the inspection of the expert is completed.

Par. 6. If the payment of dues[2] is refused for any reason, the slaughterhouse management is entitled to retain as much of the meat as appears necessary to cover the dues. The surplus remaining after the sale of this meat is handed over to the owner, provided he gives a receipt for the same.

Par 7. Fresh meat once brought into the slaughterhouse (or inspection station) must not be again taken out of the inspection-room until it has undergone inspection and been passed and stamped according to the rules laid down in these regulations.

Par. 8. The extent of the inspection is entirely at the discretion of the inspecting officer, or his representative.

The owner has no right to make any objection to the manner in which the inspection is carried out.

The owner of the meat or his employees have to render the necessary assistance during inspection.

Par. 9. If the veterinary expert or his representative finds the meat to be sound, it must be marked with the inspection stamp[3] for fresh meat imported from elsewhere, and left to the owner to dispose of as he pleases.

Pars. 10-14. Cover the same ground as pars. 8-12 in the regulations for the inspection of meat killed in the slaughterhouse.

[1]According to a decision of the Imperial Court the attestations drawn up by publicly appointed meat inspectors count as *public documents*. The same court on the other hand made a contrary decision on the 21st February, 1895, in settling that an attestation drawn up by a public meat inspector concerning the importation of meat in a parish where there was a slaughterhouse with compulsory slaughter has *not* the properties of a public document; on the contrary, the attestation is said to have the *legal rights of a private document*, and therefore any alteration is punishable according to par. 267.

[2]It can also be decreed that the interior of such animals killed elsewhere than in the slaughterhouse and exposed for inspection can only be cleansed and scalded by the payment of special dues. In Stolp these amount to 3½d. for a whole "Gerüsch" (tripe, sausage-skins, snout, and feet), and 1d. for each single portion. In Munich 6d. is charged as a scalding due.

[3]The stamping-die for this meat should be of a different shape from that used for slaughterhouse meat, or else another colour of ink should be chosen with which to stamp meat killed elsewhere.

Par. 15. After stamping the inspected meat it must be removed from the inspection-room, otherwise it can be despatched from the place at the expense of the owner.

The slaughterhouse management gives no guarantee for the safety of this meat, either in this case or any other. The custody thereof is entirely a matter for the owner.

6. POLICE ACT CONCERNING THE CONSIGNMENT TO THE FREIBANK OF MEAT NOT SUITED FOR THE GENERAL MARKET.[1]

By virtue of pars. 5 and 6 of the law as to police management of March 11th, 1850, and pars. 143 and 144 of the law as to the general government of the country, it is ordered that meat not suited for the general market shall be consigned to the Freibank on the approval of the magistrates and the permission of the president of ..... by ..... for the municipal district of the town of ..... (By such meat is meant that which is not marketable in the terms of the law concerning the traffic with articles of diet and objects of general use of May 14th, 1879.)

Par. 1. By a corporation enactment the municipal authorities of ..... have fitted up a place of sale for the disposal of meat *not suited for the market*, being of inferior quality (Freibank).

The place of sale is under the supervision of the slaughterhouse officials, is inscribed with the word "Freibank," and serves for the

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[1] In various towns, as—Barmen, Erfurt, Frankfurt, Halle, Naumburg, etc., the erection of an official place of sale of inferior meat is decreed by a *local statute*, and the *sale* of it even is regulated by a police enactment.

The Gov. Dis. of Bromberg has issued the following regulations (15th June, 1893 :

"Par. 1. Meat which is found by the public slaughterhouse experts as suitable for human use must be distinguished by being stamped in the following manner :

"(*a*) Sound.

"(*b*) Such as can only be sold or offered or sale it notice is at the same time given of its second-rate quality. To this rank also belongs such meat as is considered to have properties dangerous to health.

"Par. 2. The meat dangerous to health or unsuited for human use is to be destroyed, or to be so prepared that it can only be used for industrial purposes.

"Par. 3. The cooking and melting, the preparation for industrial purposes (par. 2), and the treatment with acids, etc., must be done in the slaughterhouse, under the supervision of the police.

"Par. 4. The sound meat (of full value) must be allowed *unconditional* free sale.

"Par. 5. The meat brought in under par. 1, n. B., can only be sold to individual purchasers in a local Freibank appointed by the police, in pieces of not over 5 lbs., and under distinct notification of the reasons for such sale, and the re-sale of such meat is forbidden.

"Par. 6. Neither meat nor inner organs can be given or sold from the Freibank to butchers meat salesmen, sausage salesmen, or hotel or restaurant keepers.

"Par. 7. Where there are differences of opinion between the slaughterhouse expert and the owner of the slaughtered animal as to the properties of the meat mentioned in pars. 1 and 2, the opinion of the official veterinary officer of the place is to be taken, and the expenses thereof are to be borne by the losing party.

"Par. 8. Contraventions of the above orders are to be punished by a fine of as much as 30s., or a corresponding term of imprisonment, unless a greater punishment has been incurred by the breaking of some other law."

sale of the inferior meat of such animals as have been killed in the slaughterhouse or have been slaughtered elsewhere and brought in for the purpose of inspection.[1]

Par. 2. The decision, whether meat is to be consigned to the Freibank, and in what condition it is to be sold there, is made by the slaughterhouse manager. If the owner of the meat declares himself to be dissatisfied with the verdict of the slaughterhouse manager, he must immediately, or within twenty-four hours, make a deposition to that effect. This deposition is at once put before the police, who then call for a further inspection to be made in the manner decreed in par. 11 of the regulations concerning inspection, etc.

Par. 3. The meat remains in the custody of the slaughterhouse until its sale. If blotchy meat is to be pickled, the owner must provide the necessary pickle-cask and order and prepare the prescribed brine. The cooking of the meat and the melting of the fat are done in the meat steaming apparatus belonging to the slaughterhouse, which can only be set in operation by the orders of the slaughterhouse manager.

Par. 4. The meat destined for the Freibank must be stamped accordingly, and must be sold to consumers only in quantities of from a half-pound to seven pounds.[2] Butchers, sausage-makers, salesmen, hotel-keepers, and restaurant owners, and all such persons as make a trade of the sale of meat must neither personally nor through a third party buy meat at the Freibank.

Par. 5. The meat on the Freibank is sold by the salesman officially appointed for the post by the magistrates, in accordance with the orders issued specially for this purpose, unless the owner of the animal objected to or his agent undertake the sale of this meat personally.

[1] Schneidemühl recommends that the following orders be added to the Freibank regulations: "Animals killed out of necessity can only be sent to the Freibank for sale if the owner can truthfully declare that these animals were already in his possession before they sickened."

Imported meat, which is proved to be of little value or not marketable, should be as a rule excluded from the Freibank.

The Freibank should be open to the farmers and such cattle owners of the surrounding district when they can honestly declare that the animals to be killed could not have been pronounced unmarketable or of little value *before* slaughter, either on account of some outwardly recognisable disease or extreme leanness, the inferior or valueless nature of the meat only being discovered at the inspection thereof *after* slaughter.

[2] In some towns 5 to 10 lbs. of meat may be sold to consumers.

Par. 6. The price[1] of the meat on the Freibank is fixed by the owner of the animal from which the meat comes. If it finds no sale within three periods of twenty-four hours, it is ordered by the police either to be destroyed or utilised for industrial purposes, according as the slaughterhouse manager sees fit. In certain circumstances this period may be curtailed, if, for instance, it undergoes some change which would make it injurious as an article of diet.

Par. 7. The price settled by the owner, the reason of the objection to the meat, the day and hour of the sale, are made known in the local newspapers by the slaughterhouse management, at the expense of the owner, and must also be noted on the slate or card hanging in the Freibank.

The cleaning out of the latter, and of the vessels and instruments used, must be done by the owners of the meat objected to, or at their expense.

[1] Regulations Concerning the Sale of Meat in the Freibank at Stolp.

Par. 1. The sale of meat which is consigned to the Freibank must be undertaken by the official salesman specially appointed by the magistrates, should the owner of the animal decline to sell it.

Par. 2. The Freibank salesman, who must on no account have anything to do with any other kind of meat, must adhere strictly to the slaughterhouse rules, and always obey the orders of the manager. He has to see that the meat objected to is conveyed to the rooms where it is to be stored, unless the owner raises an objection to the decision of the manager, when he must remove it thence himself. The official salesman must afterwards have it taken to the Freibank for sale. He must also remove all diseased parts from it under the direction of the manager or his representative, and prepare it for sale—get it ready for boiling or pickling, as the case may be, and to have the inner organs scalded and prepared also.

Par. 3. The sale must begin *punctually* at the hour arranged for by the manager. The salesman is responsible for all the dealings and mistakes of his assistants.

Par. 4. After the sale is over, he has to see that the rooms and utensils used are properly cleaned at the expense of the owner to whom the questionable meat belonged.

Par. 5. The meat (four quarters and head with suet excluding all the inner organs) which is consigned to the Freibank in a raw state, must first be weighed out to the salesman when it is cool and dry. That meat which is sold in a cooked state must not be weighed until it is perfectly dry after boiling and the loose and hanging bones are removed. Of the then settled weight, the salesman is allowed five per cent. good weight; but the director can have the lower parts of the fore and hind legs of particularly lean beasts removed before the weight is fixed.

Par. 6. The salesman shall receive as payment for the preparations of such food in a cooked state (including scalding, carriage, etc.) 2s. for every large beast; 1s. for every young beast or pig; 6d. for every small beast. For the sale of this as well as the meat sold on the Freibank in a raw state (including cutting up and weighing), the salesman shall in every case receive 1d. for 12 lbs. For the rendering of suet, lard, etc., alone he shall receive a 1d. for 8 lbs. (raw weight). For the sale of such goods he shall also receive 1d. for 12 lbs., reckoning on two per cent. loss of weight.

Par. 7. The salesman is obliged to enter all expenses in a book, and to give this up to the slaughterhouse book-keeper every day immediately after sale hours are over. An exact account on every single animal must follow the next day at the latest. If no reasonable objections to this account be made either in writing or on deposition to the slaughterhouse manager within twenty-four hours, it is considered to be acknowledged as correct.

Par. 8. The slaughterhouse book-keeper has to keep a special book for the receipts and expenditure of this department and must make out a specific account to the owner of the meat objected to. The owner then gives a receipt to the slaughterhouse book-keeper, after the expenses have been subtracted and the remainder is paid.

Par. 8 treats of taxes and dues.

Par. 9 sets out the various penalties.

Par. 10. The Police Act comes into force on the day of publication.

7. POLICE ACT CONCERNING THE KILLING OF ANIMALS AND WEIGHING OF CARCASES.

By virtue of pars. 5 and 6 of the law on police supervision of 11th March, 1850, and of par. 144 of the law on the general management of the country of 30th July, 1883, the following police enactment[1] is issued for the environs of the town corporation of. . . . for the prevention of disagreements as to the slaughter and weighing of animals sold by dead weight in the municipal slaughterhouse.

Par. 1. If the sale price for an ox, calf, sheep, or pig be decided by agreement according to *dead weight*,[2] the following rules hold good for the slaughter and for the ascertaining of the weight, if other arrangements have not been expressly made. The following portions are to be removed *before* weighing.

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[1]This police act is mainly founded on the principles which were agreed upon by the delegates of the Conference on German Slaughterhouses, as to the slaughter and ascertaining of the weight of the various species of animals, held at Berlin on the 12th to 15th May, 1896, and attended by the representatives of the farming industries, the cattle dealers, and the butchers.

[2]Hengst gives the following definition of dead weight:

"As a rule dead weight and *meat weight* are confused with each other, but still both terms are in no way identical. As a rule it can be accepted that by *dead weight* the weight of a slaughtered animal is meant, before the removal of the organs adhering to the meat, or the fatty parts which could not be designated as meat fat, the slaughtered animal accordingly not being cut up.

"The *dead weight* thus corresponds to the weight of a slaughtered animal which has been bought according to its weight when alive, and in the decreased weight of which after slaughter neither buyer nor seller has any interest, because it has no further influence on the price.

"The *meat weight*, on the contrary, is that of a slaughtered animal which is ascertained after all the organs and fatty portions not belonging to the meat—the four quarters—have been removed. Thus in oxen this means the weight of the four quarters ready for hanging up.

"Only in the case of calves is a deviation from the normal necessary, because in their case the kidneys are sold along with the meat, and therefore must be reckoned along with it.

"If the prices be uniform for dead weight and meat weight in the slaughterhouses and cattle-yards, there must accordingly be standards set up, to prevent different prices being quoted. That such a standard is necessary is evident, because in the case of well-fed oxen the meat weight can differ from the dead weight as much as a hundredweight. Therefore the fluctuations in price could amount to five shillings the hundredweight or more.

"In the case of poorly-fed beasts the difference between the two weights is unimportant.

"Of the two I should give the preference to the dead weight, because it can be more surely fixed than the meat weight, and because in the case of the latter the so-called 'pruning' of the meat is necessary, it can very easily happen that the butchers overstep the mark in this matter.

"In fact, this has been carried to such an extent in Leipzig that the Town Council have had to issue a regulation, according to which the dead weight must be the guide.

"The result is an average weight between the two, because concession must be made to both parties interested—the salesmen and the butchers.

"If one does not care to adopt this dead weight, it is a matter of indifference whether the actual dead weight or the meat weight, or a standard of weight combined from both, is chosen as the standard to go by; it must only be borne in mind that regulations introduced concerning it must not differ too widely from the common usages of the trade, because otherwise, especially by

I.—From Oxen.

(*a*) The *skin*, but so that no meat or fat adheres to it, the *tail* being cut off with no tail fat along with it.

(*b*) The *head* between the two occipital bones and the first cervical vertebra perpendicular with the vertebral column.

(*c*) The *feet* at the first joint of the tarsus and over the tibia.

(*d*) The *organs* of the *breast*, *belly*, *and pelvic* cavities with the cushions of *fat* adhering to these (heart fat, etc.), with the exception of the meat and suet of the kidneys, which are to be weighed along with the other meat.

(*e*) The *blood vessels* belonging to the vertebral column and the outer part of the breast cavity with the tissue adhering to these; also the *windpipe* and the sinewy parts of the diaphragm.

(*f*) The marrow of the back.

(*g*) The penis and the scrotum of oxen, without the fat of the latter; the udders, etc., of cows.

II.—From Calves.

(*a*) The *skin* along with the *feet* at the lower joint of the tarsus, as for oxen.

(*b*) The *head* between the occipital bones and the first vertebra.

(*c*) The *contents* of the *breast*, *belly*, and *pelvic cavities*, with the exception of the kidneys.

(*d*) The navel and lower organs.

III. From Sheep.

(*a*) The *skin* or *hide* along with the feet from the lower joint of the tarsus.

(*b*) The *head* between the occiput and the beginning of the vertebræ.

(*c*) The *contents* of the *breast*, *belly*, and *pelvic cavities*, with the exception of the kidneys.

(*d*) The udders of ewes and lower organs of rams.

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the introduction of a uniform quotation of prices, it is to be feared that there would be innumerable and insurmountable difficulties to be met with."

On an average, oxen lose thirty-five to sixty per cent.; cows fifty to fifty-five per cent, occasionally sixty; old oxen forty-eight to fifty-three per cent.; bulls forty to forty-five per cent.; steers forty per cent.; heifers forty per cent., occasionally only thirty-five per cent.

Sheep fifty to sixty per cent., never less than the half, with slight differences above.

Calves thirty to forty per cent.; small animals more than large.

Pigs twenty to thirty per cent., large more, small less; boars losing about thirty per cent., often more, and sows twenty-five to thirty per cent.

IV.—From Pigs.

(*a*) The inner organs of the breast, belly, and pelvic cavities, along with the tongue, windpipe, and throat, but with the exception of the kidneys and the seam.

(*b*) The lower organs.

Par. 2. The weight of oxen must be ascertained either whole, or in halves or quarters; calves must be entire; sheep and pigs either whole or in halves.

Par. 3. All diseased parts must be cut away after inspection *before* weighing, and must not be weighed along with the rest, under any circumstances.

Par. 4. If the slaughter weight is decided within twelve hours after slaughter, and in the case of other animals within three hours, one pound must be deducted from every hundred pounds to allow for decrease on cooling.

Par. 5. For ascertaining the weight, the scales fitted up in the slaughter-halls are to be used. A weighing ticket is given for every weight taken, on which is marked the dead weight.

Par. 6. If there are disputes as to the weight, every interested party is *entitled* to demand that the matter should be settled by a *committee*.

This committee consists of the manager of the slaughterhouse (or his representative) and two butchers, or one butcher and one cattle dealer. The latter are to be chosen annually by the magistrates.

The announcement of the decision of the committee is to be made during business hours by the manager, the party who made the demand having to pay down 10s. for an ox, and 5s. for any other animals, as compensation for the time consumed by the members of the committee. The money thus paid will be divided equally between the two outside members of the deputation.

The committee has to give an opinion after making inquiry into the matter, and to settle the amount of the damages, after hearing all sides of the questions from unbiassed witnesses. The chairman has to make a deposition as to the results of the inquiry which is to be kept by the management, after being signed by all the members. If the opinion given by the committee is contrary to that of the person demanding the inquiry, the latter cannot claim back the money he paid down as compensation, while, if they decide in his

favour, he is paid back his money, and the same amount is claimed from the other party. If the committee has been asked to settle the matter at the request of both parties, the former decides how payment of compensation shall be made.

Par. 7. Hired butchers and their assistants may only slaughter the animals enumerated in par. 1, according to the instructions given in that paragraph.

Par. 8. Contraventions are punished . . . .

Besides this, any contravention on the part of the hired butchers can be punished by the cancelling of their right to kill for strangers.

Every hired butcher is responsible for his assistants.

8. POLICE REGULATIONS CONCERNING THE TRAFFIC IN HORSE AND OTHER FLESH.

Par. 1. The killing of a horse, mule, or ass, the meat of which is to be offered for sale or made into sausages, or used in the preparation of similar wares, may only take place in the municipal slaughterhouse.*

Par. 2. Meat of horses, donkeys, etc. (see par. 1), and also sausages prepared from such meat, must only be offered for sale in such places as have been appointed by the magistrates. In these places no other preparation of meat must be kept or exposed for sale, or dealt with in any way whatever.

Every place of sale of this kind—it is immaterial whether it be in the market or in a private building—must be provided with a conspicuous signboard stating in clear letters (at least six inches in height) that here is a place for the "sale of horseflesh," or of "goods manufactured from horseflesh."

Also, all vessels or dishes for keeping horseflesh, sausages, etc., that are being offered for sale, must have "horseflesh goods" stamped on the outside clearly enough to be easily read, and in such a manner that the letters will not wash off or become faint in course of time.

Par. 3. The animals mentioned in paragraph 1 must always be examined directly before slaughter by the slaughterhouse veterinary surgeon as to the condition of their health. If it is

* To forbid entirely the importation of horse meat and goods made from it would contradict the slaughterhouse law and the trade statute. It is only allowable legally to make controlling regulations as to its importation and sale.

found that the animal when alive exhibits symptoms which would lead one to suppose the flesh of it would be unfit for human food, the slaughter must not take place. The meat found suitable for human and animal consumption on a second inspection after slaughter must be marked with the official slaughterhouse stamp, that which is unsuitable being thrown away.

Par. 4. Every horse-butcher must keep a slaughter-book stamped by the magistrates, and drawn up on the plan shown at the end of these regulations. The first four columns must be filled up by the horse-butcher whenever he has brought the animal into the slaughterhouse.

It is sufficient to put down in the fourth column the name of the person from whom the animal was obtained. The fifth column is to be filled up by the slaughterhouse veterinary surgeon (see par. 3).

The animal must be presented for inspection before the above official, not more than twenty-four hours before slaughter. The sixth column must be filled up by the horse-butcher twenty-four hours at the latest after slaughter.

Par. 5. The slaughter-books remain in the slaughterhouse, and must only be given up to the horse-butcher for a short period at a time, twenty-four hours at most.

Par. 6. The meat of horses, etc., suitable for human consumption may only be made into sausages, etc. (par. 2), in the work-rooms of the horse-butchers.

Par. 7. In the preparation of horse-meat sausages, no other meat must be used except the meat of horses, mules, or donkeys, but the addition of lard is permitted.

Par. 8. The places for the sale of horseflesh and goods prepared from horseflesh, and also the work-rooms of the horse-butcher, are under the control of veterinary officials appointed by the police.

Par. 9. *Penalties.*—The meat of horses, donkeys, etc., killed in defiance of the above regulations, and also the wares prepared from such meat and offered for sale, dealt in, or for exportation can be forfeited, and will be destroyed in the slaughterhouse.

Par. 10. These rules become valid on the day of their publication.

Model of the Slaughter-book.

1	2	3	4	5	
No in order.	Description of horse, donkey, and mule; age, size, colour and characteristics.	Day of purchase.	Name of the person from whom it was obtained.	Certificate of police veterinary surgeon as to animal's state of health.	Day of slaughter and subsequent disposal of meat.

Tariff for the Use of Municipal Slaughterhouses and Meat Inspection Stations.

By reason of pars. 2, 3, and 5 of the laws of March 18th, 1868, and March 9th, 1881, the following tariff is fixed by the agreement of the municipal corporations of . . . (and with the permission of the District Committee)—(*a*) for the use of the municipal slaughterhouse and for the inspection of animals killed there; and (*b*) for the inspection of animals brought into it after slaughter.

I.—Slaughter Dues.

Whoever kills, or causes to be killed, animals of the following description in the public slaughterhouse, must pay for the use of the rooms and appliances arranged for this purpose, and also for the inspection of the animals before and after slaughter—(*a*) for a bull or ox, ; (*b*) for a cow or horse, ; (*c*) for a young beast, ; (*d*) for a calf, ; (*e*) for a sheep or goat, ; (*f*) for a pig (exclusive of trichinosis inspection), ; (*g*) for a sucking pig. .*

The slaughterhouse manager or his representative decides in cases of disagreement to which of these classes a certain animal belongs. This rule holds good as regards *all* dues.

Besides this, —pence must be paid for the microscopic inspections of pigs (sucking pigs also), or parts of such, and also for animals of this description killed elsewhere or submitted for inspection.

II.—Stall Dues.

1. If the animal remains more than twenty-four hours in the stables of the slaughterhouse, a due of — shillings must be paid

*In many slaughterhouses special dues are levied for lambs, kids, sucking pigs, etc., which are about half the price fixed for full-grown beasts. To prevent disagreements, it is necessary to state definitely in the tariff that by lambs, kids, etc., are understood only such animals as are still being nursed by their mother, and also to stipulate their live weight at about 30 lbs. to 40 lbs., or 15 lbs. to 20 lbs. when killed, and that they are not more than ten to twelve weeks old.

for every calendar day extra —(*a*) for each large beast —shillings ; (*b*) for a pig or a small beast —shillings.

III.—Fodder and Service Dues.

1. The fodder which is served to the animals in the slaughter-house is to be paid for, according to the tariff, fixed quarterly by the magistrates, and made public by being displayed on posters. The magistrates also settle the quantity of fodder and straw to be given to each animal.

2. If the animals are not fed and watered by the servants of the owner, but are attended to by the slaughterhouse officials, then a charge must be made for every calendar day, as follows—(*a*) for every large beast —s. ; (*b*) for a pig —s. ; (*c*) for every small beast —s.

IV.—Weighing Dues.

1. The following charges must be made for weighing—(*a*) for a large beast —; (*b*) for a young beast —; (*c*) for a calf or pig —; (*d*) for a sheep or sucking pig —.

2. For the weighing of killed meat, for which rules concerning killing and weighing are given, and for suet, fat, and hides, etc., the following dues will be levied—(*a*) for an ox —s. ; (*b*) for a pig —s. ; (*c*) for a calf —s. ; (*d*) for a sheep —s. ; (*e*) for fat, suet, skins, etc. —s. : for the first hundredweight —s. ; for every further hundredweight —s.

V.—Scalding Dues.

Par. 5. (*a*) For the scalding of a pluck (tripe, feet, mouth) if the animal in question has not been killed in the slaughterhouse, —s ; (*b*) for parts of such —s.

VI. —Charges for the Use of the Boiling Apparatus and for Tallow-rendering.

Par. 6. (*a*) For the boiling of an ox, —s. ; (*b*) for the boiling of a pig, —s. ; (*c*) for the boiling of a young beast, —s. ; for the rendering of every fifty-six pounds of fat (raw weight), —s.

VII.—Charges for the Use of the Cold Store.

Par. 7. For the use of the cold store there will be levied annually for every ten square yards of ground surface, —s. ; for the use of separate hooks in common cells for every twenty-four hours, —s.

THE ROYAL SANITARY LIBRARY

VIII.—Fees for the Inspection of Meat killed outside the Slaughter-house, and then brought in.

Par. 8. (*a*) for a large beast, —s.; (*b*) for a large pig, exclusive of dues for trichinosis inspection, —s.; (*c*) for a young beast, under 625 lbs. dead weight, —s.; (*d*) for a calf, under 185 lbs. dead weight, —s.; (*e*) for a sheep or a sucking pig, exclusive of trichinosis inspection, —s.

IX.—General Directions.

Par 9. No charges must be levied except those mentioned herein.

Par. 10. Fees may be levied in advance, but in every case fall due and must be paid immediately the transaction is completed or the article is given out for which they are exacted. Payment of the dues should be made into the slaughterhouse exchequer at the office, when a receipt will be given in return.

Par. 11. The receipt must be shown to the controlling official on demand when leaving the slaughterhouse.

Par. 12. Should the charges not be paid, the animal or meat on which they are due may be detained in the slaughterhouse until payment is made.

Par. 13. If anyone refuses to pay the dues, the slaughterhouse management is entitled to detain the meat, and to sell as much as is necessary to cover the loss sustained. The surplus is to be given up to the person who ought to have paid the dues, a receipt for which must be obtained from him in the slaughterhouse office.

Par. 14. This tariff becomes valid on the day of its publication.

Book-keeping.—A few words must be said on the book-keeping department of the slaughterhouse, which deals with the cash on the one hand and with meat inspection on the other. For the cashier's work the following books are required: 1. A cash paid book. 2. A cash received book. 3. A dissecting book for receipts and expenditure. 4. A weight book.

In many slaughterhouses there is no special book for containing the names of the butchers, etc., but the numbers of the slaughter-tickets sold are entered up daily. A special book is sometimes kept for other receipts than for slaughters.

The entire receipts and expenses are entered daily into one book. Besides this there is a dissecting book, the pages of which are divided into columns, each with a different heading. Into this the

expenses and receipts are entered each under its own heading, so that one can see at a glance the entire financial position of the slaughterhouse. It is easy to reckon up the annual expenses if thus methodically arranged.

A weighing book is indispensable, unless the name of the party having the cattle weighed and also of the receiver of the goods are both noted in the part of the weighing ticket reserved by the slaughterhouse management.

The slaughter-tickets in use are of various forms, and are often very impracticable. It is not necessary to have the name of the butchers, the place, the date, etc., filled in at length in both the part that is retained by the cashier and the part given to the butchers. If it is a matter of indifference to the office *who* pays the dues, it is then still less important that this name should be written out on the ticket; it is only necessary that further use of the ticket should be prevented by tearing off a corner, perforating, etc.

For meat inspection the following books are necessary: A day book of slaughters and inspection; a day book of the inspection of imported meat; a report book of the notification as to doubtful meat; and a certificate book. (It is absolutely necessary that at least a small amount be included annually in the estimates to be spent on scientific books and newspapers for the benefit of the officials.)

CHAPTER XII.

THE UTILISATION AND DESTRUCTION OF CONDEMNED MEAT.

The Freibank — boiling and destroying apparatus — knackers. The expressions "tainted," "not marketable," "deficient," "of inferior value."

The meat of the slaughtered animals is divided into three categories according to the inspection made by the experts :

1. Into such as is perfectly sound ("marketable"), which is then stamped as such and sold without restriction.
2. Such as without being dangerous to health—(*a*) shows objectionable alterations of its substance ; (*b*) as comes from animals which are suffering from an important outward or inward disease "not marketable" ("of inferior value" or "tainted" in the sense of the Articles of Diet Law of May 14th, 1879).
3. Such as is wholly unsuited for human use, and dangerous to health, and must be destroyed or utilised industrially.

But while the Articles of Diet Law (par. 12) strictly forbid the purchase, etc., of articles of diet "the use of which is liable to injure human health," the purchase of "tainted" eatables is nevertheless allowed, if the purchaser is acquainted with the quality and origin of the meat, for the law is framed for the purpose of protecting the general public by requiring those who sell or offer for sale tainted, artificial, or adulterated articles of diet to let would-be purchasers know exactly of what quality the goods are, which if not absolutely unusable or dangerous to health are still of inferior quality.

"Freibank meat" is wrongly termed "inferior," although it has often no peculiarity in its chemical composition, and often indeed is very similar to other meat as regards the nourishment it contains. "Inferior" meat in the true sense of the word is such meat as is got from badly fed or too young or too old beasts, or from animals raised for breeding purposes.

General Remarks on the Freibank.—The institution of the Freibank is not of recent date by any means; for in the middle of the thirteenth century we find that regulations were made that good meat without blemish of any sort should be exposed for sale in the best part of the market, on benches covered and protected from wind and weather, the poorer and diseased meat being relegated to bare benches. In the towns laws of Wimpfern for 1404 we find a regulation that the Freibank must be erected at a certain distance away from the stalls for the good meat. Then in the Mühldorf town laws of 1367 it is ordered that blotched meat and that which has been "probed by the Jews" can only be sold at certain stalls, the seller being commanded, under penalties, to let people know what sort of meat they are buying. The laws laid down to country butchers are most particularly strict, their meat was always regarded as "inferior" and like Freibank meat. Sheep had to be brought in without being cut up in any way. In Augsburg the country butchers could only bring their meat into the town at certain seasons of the year. The Jews, too, could only kill in certain places arranged for them, and had to sell their meat at certain stalls—a rule which held good for many years in Nüremberg and Frankfort a/M. amongst other towns. In Augsburg a Jewish slaughtering-place existed until quite recently. The place of sale assigned to country butchers had also a special name; here these butchers who had killed on their premises had to offer their meat for sale.

But not only in South Germany, but in the northern parts also there were Freibanks in some towns in the middle ages, for instance in Hamburg, Danzig (1375), Lubeck, Stade, and Zwickau (1348).

In Belgium and Italy Freibanks are of recent growth, but in France they existed in the middle ages under the names of "craberie" or "crabrerie."

But it is only of late years that with the increased extension of obligatory meat inspection and the erection of public slaughter-houses, the question as to the advisability of such institutions has become a subject of animated discussion amongst the different parties interested. For while the one side, the consuming public, rightly demands that they should obtain thoroughly sound meat for their money, the other side, the producing farmer, naturally wishes to guard against the injury which results from the action of the law.

Half-way between these two parties stand the dealers and the butchers, who may be greatly involved, if a producer, having sold his beasts to them without security, leaves them to bear the damages, if any, on their own shoulders. For agricultural and economic reasons, it is a matter of pressing necessity that every body of magistrates resolved on the erection of a public slaughter-house should at the same time build a Freibank or similar institution, as only thereby can the experts of the slaughterhouse thoroughly and satisfactorily preserve everyone's interest. For if they are too lax in their judgment as to marketable meat, then is the value of the meat inspection comparatively doubtful; if, again, they are too strict, then, on the other hand, great quantities of relatively eatable meat are withdrawn from consumption that could have been sold to the poorer portions of the community at a low price, as it is a fact that more people are ill and weak through want of sufficient nourishment than from the consumption of diseased meat. On the other hand, they directly injure the producers, who, by the sale of the meat in the Freibank, can save about one-third of the original value, and they also indirectly affect the national income. In a word, "the capital represented by animals for slaughter must not be confiscated unless it is absolutely necessary for the preservation of human health."

At the nineteenth general meeting of the German agriculturists, the general secretary, Dr. Müller, in supporting his motion to ask the Government to remove some legal obstacles in the way of the general erection of Freibanks, and to urge corporations to build such places so as to promote the erection of these institutions in agricultural districts, said:

"1. The constantly increasing demands in all departments of the meat market, made in the interests of public health and for the protection of the consuming public, call from the cattle breeder for continually increasing sacrifices.

"2. The centralisation of the butchering trade in public slaughterhouses, the consequent obligatory meat inspection, as well as the further development of veterinary science, with its keener control over the meat traffic, cause a very considerable loss to breeders and also to the national income.

"3. And, further, although the breeders fully recognise the necessity of certain laws on the grounds of public health, still they

have a right to demand, in view of the great loss which such laws entail, that they are only required to make such a sacrifice as is absolutely necessary for the attainment of that protection.

"4. In order to limit to a minimum the losses accruing to the breeder and to the country as a whole without endangering the interests of the consuming portion of the population, opportunity should be given for erecting Freibanks.

"5. Freibanks may be considered as correlative to the centralisation of the butchering trade in slaughterhouses and obligatory meat inspection. They are all simultaneous preliminary conditions for the general carrying out of slaughterhouse precautions.

"6. The Freibank has been a success wherever it has been established for any length of time, and is recognised by consumers and producers as an arrangement serving the interests of both sides equally well.

"7. The Freibank answers to the requirements of public sanitary regulations and to the consuming public; because it

"(*a*) Perfectly excludes the traffic in meat injurious to health;

"(*b*) Because it reserves to those consumers who are willing to pay for it, the meat only of thoroughly sound and strong animals, while they have security that they are obtaining what they desire;

"(*c*) And, lastly, because it makes it possible to utilise meat of inferior quality or which comes from diseased animals, without being *injurious to health*.

"The Freibank also answers to the requirements of the producers and the interests of the people generally:

"(*a*) Because it gives a certain, although restricted, value to such animals as would otherwise have to be destroyed;

"(*b*) Because it limits to a minimum the combined losses of the producers and the loss to the national income;

"(*c*) Because it prevents the butchers and dealers demanding unjustifiably high compensation claims from the producers for rejected meat.

"8. Therefore it is as necessary to have Freibanks wherever there are slaughterhouses as it was to erect the latter. Obstacles in the way of their erection in already existing land laws should be removed as speedily as possible."

Schneidemühl says with truth: "The principal value of the Freibanks arrangement is this—that everyone who wishes to buy, eat, and pay the common market prices for good meat, will be able to obtain it, and no other, in the public butchers' shops of the town, while those who are willing to eat the meat of diseased animals, so long as the particular part is healthy, of good quality, and not too dear, may obtain such in the Freibank."

In appreciation of these facts, Freibanks have been erected for a great number of years in the South German Confederated States, Bavaria, Würtemberg and Baden, in the Grand Duchy of Hesse, in the Duchy of Gotha, and in the Principality of Schwarzburg, Rudolstadt, etc., etc.

Objections to the Freibank.—Of course there are no lack of objections to the Freibank. First, the butchers oppose it with all their energies, as they do every regulation concerning their trade. At the thirteenth annual meeting of the Affiliated Confederation of Butchers much was said in its disfavour, and principally against the sale of inferior meat. Much of the same nature was said at the fifteenth meeting at Metz and at the sixteenth in Dresden, where the Freibank was called the "darling project of veterinary surgeons, in order to keep up which they had to find the wares." In bygone days, butchers seem to have been of another opinion; for at the fifth annual Butchers' Congress it was unanimously resolved that an appeal should be made to higher quarters, "that par. 367 of the Penalty Law be changed so that every butcher should have proper protection, and that a law be made allowing animals which have been treated by a veterinary surgeon, or diseased animals which are pronounced by a medical man as fit for consumption, although less valuable, to be sold in the *so-called Freibanks*."

Very different is the resolution of the seventeenth annual Congress, when, of course, the Freibank question came in for the most animated discussion. As it has gradually become apparent that the once desired Freibank cannot be swept away, and that former opponents now recognise and enjoy the benefits thereof, it was resolved "that all confiscated goods, which might still be used as food, should only be exposed for sale on the Freibank in a *cooked* condition." In this respect the butchers now stand in direct opposition to the proposals made by various well-known authorities. Schmaltz says: "Cooking (sterilising) must not be criticised or

condemned summarily. It depends on the material. This must be divided into two classes:

"(*a*) There is such a thing as meat which when uncooked is injurious to health, and yet when boiled becomes fit for consumption. Such meat ought not to be sold *raw*, not even in the Freibank. If such meat is boiled and so retains a small portion of animal value, it is then a very suitable and useful arrangement, for it retains something of what would otherwise have been lost.

"(*b*) But there is a second kind of meat which is fit for consumption, although not blameless in respect to quality, and therefore wherever Freibanks exist, this must only be sold under a declaration. The cooking of this meat is forbidden by law. The boiling process makes an important difference on the goods, for thereby they are changed into a less valuable commodity, and the sale under declaration does not damage them in any way. The prices fluctuate according to supply and demand, just like any other article of trade. A compulsory limitation of the sale price is forbidden by law.

"Thus it may be said that the law recognises that boiling or sterilising must not take place in the Freibanks."

The same author goes on to say: "Boiling comes very near to the entire destruction of the meat in question; it will also not be nearly so well utilised as when sold fresh." This assertion is not quite to the point, for the difference in price between raw and boiled meat, especially pork, is very small, but one cannot disregard the limited utility of cooked meat. It must be recognised as a safeguard to the general public, for it is a well-known fact that *raw* Freibank meat indirectly passes more easily into the hands of consumers, who would be certain not to buy it if they were to know its origin, than cooked meat, the characteristics of which could no longer be detected.

That butchers in particular should struggle against every form of Freibank is quite natural, "for," says Dr. Müller, "where there is a Freibank under magisterial supervision, a competition arises which they do not desire. It is not that they have an objection to Freibank meat or that they wish to guard the public against the use of inferior goods. On the contrary, they claim that they ought to utilise such goods themselves, but of course just as they would

meat of a better quality. They are certainly not guided by the interests of the consumers, but they fear the competition that arises.

"Others fear that dissatisfaction would be felt by the poorer population, who would say, 'Diseased meat is good enough for us poor people, *we* must buy it, as we cannot afford the price for sound meat.'

"Other objectors urge that meat-inspection has only sanitary ends in view and leaves national economies out of the question. A Freibank is in direct opposition to these principles, for diseased meat is sold all the same, whether or not it is injurious to health. Who can aver this with absolute certainty? The experts can perhaps decide that it has had no injurious effects upon animals, but must it therefore necessarily follow that it will not be hurtful to mankind?

"Practical experience tells us that these arguments are untenable; if, however, anyone is in the least degree afraid that the meat relegated to the Freibank is dangerous in its raw condition, the experts can determine that the meat be only sold after being cooked, and we now possess such admirable arrangements for making meat absolutely germ-free, that no exceptions can be taken to it in the latter form.

"Finally, it is often advanced that in small towns it will be impossible to prevent Freibank-meat from being used indirectly in the restaurants for sausage-making, etc. But a careful and conscientious control will soon bring to light all such underhand proceedings, because such buyers never come themselves, but employ a third party, on whose silence they depend, and consequently it is not always to be relied upon."

Amongst the other objections to a Freibank, one must recognise the possible bad effect on cattle-breeding and also on the prices of meat. The one is as unlikely, however, as the other, and past experience shows that such an effect is improbable.

But it must be recognised on all sides that the sale on the Freibank of other meat which has not been rejected—as is done in some towns, Munich, Leipzig, Frankfurt a/M., etc.—is quite a mistake. This undoubtedly is diametrically opposed to the real purpose of the Freibank, and must arouse the dissatisfaction of the butchers.

Also wherever horses are slaughtered, care must be taken that horseflesh be not offered for sale at the general Freibank.

Various Freibanks.—These may either be—

1. Places of sale for raw and, in cases of emergency, of cooked meat in those slaughterhouses under the supervision of magistrates or slaughterhouse officials.
2. Places for the sale of cooked meat only, under slaughterhouse supervision.
3. Places where raw, unmarketable meat is stamped with a special stamp proclaiming it as such, and where it is returned to the butcher to deal with.
4. Places where the meat is cooked and returned to the butchers to sell in their shops.

A Freibank is erected for *special* purposes, and carried out under *strict supervision*. Therefore the classes represented by three and four should not be allowed, and can be in no wise recommended, as the public are insufficiently protected. For as all the portions, particularly of large animals, cannot be stamped, there is always the danger that dishonest butchers will offer the unstamped meat to the public as goods of the highest class, or else make it into sausages, etc.

ARRANGEMENTS AS TO THE COOKING OF DISEASED MEAT.

A variety of apparatus have been made in which to render the meat from diseased animals uninjurious before offering it for sale in the Freibank. In a circular issued by the Imperial Government at Bromberg, the towns in the district are advised how to cook rejected meat so that it may be utilised, and still contain as much nourishment as possible. "The principal duty of the public slaughterhouses, to see to the economic interests of the community as well as to its sanitary matters, does not seem to be sufficiently borne in mind. While in some slaughterhouses scarcely any rejections are made amongst numerous animals, in others the proportion of rejections is too great. It is not possible that this unequal proportion is due to disease in the animals, for the general percentage taken of diseased and sound animals confutes this theory; the circumstance seems rather to be due to the want of judgment of the slaughterhouse managers.

"A further cause of the manifold rejections is that the meat is only divided into 'meat of full value' and 'meat injurious to health.' But experience has taught us that these two divisions do not suffice. A third should be made to include such meat, the origin of

which is not blameless, but which by special preparation can be made fit for food. This is the so-called 'inferior meat,' on sale in many slaughterhouses under police supervision. This method, although not wholly unobjectionable, is a way of guarding economic as well as sanitary interests. Experiments have lately been made in Berlin with a sterilisation apparatus, and have turned out highly satisfactory. By means of this apparatus it is possible to heat large pieces of meat right through, so that not only all animal parasites but also all infectious germs of an organic nature are destroyed without the nourishing qualities or the taste of the meat suffering thereby, and without any loss being incurred. A great part of that meat, which could otherwise be only offered to consumers conditionally or which without special preparations would be dangerous to health, is thus saved for human nourishment.

"The meat injurious to health can also by treatment with this apparatus be converted into material suitable for industrial purposes or for manure.

"I therefore advise the magistrates to make such arrangements as will meet both sanitary and economic requirements."

At first the meat was cooked in a common brick-set boiler, but this method has many defects. A high enough temperature to kill all the deadly parasites and germs could not be reached without a protracted period of boiling, and meanwhile a great deal of valuable nourishment was lost in the process of cooking. A better method was afterwards discovered by the use of a double-jacketed boiler, heated by steam, of the kind usually employed for melting tallow. But this method also entailed a considerable loss of valuable nourishment, while at the same time the temperature necessary to make the meat germ-free was seldom reached, because this boiler could rarely be closed tightly enough, and was not fitted up for a high steam pressure.

This disadvantage is overcome in the *Becker-Ullmann cooking apparatus*, which is often used in large institutions where a great number of people have to be catered for. It consists of large cooking vessels set in double wooden boxes, painted with enamel. Each vessel has a double wooden lid. The steam enters through a valve and pipe at the bottom, so that it can be regulated at will, and a temperature of 197° F. can thus be obtained. The meat thus cooked loses relatively little extractive matter, and becomes

soft and juicy, and at the same time it is an absolute certainty that all the hurtful germs are destroyed.

Of late, apparatus has been specially constructed for this purpose, in which boiling, disinfection, and sterilisation can be carried out by means of steam at about 12 lbs. pressure and a temperature of

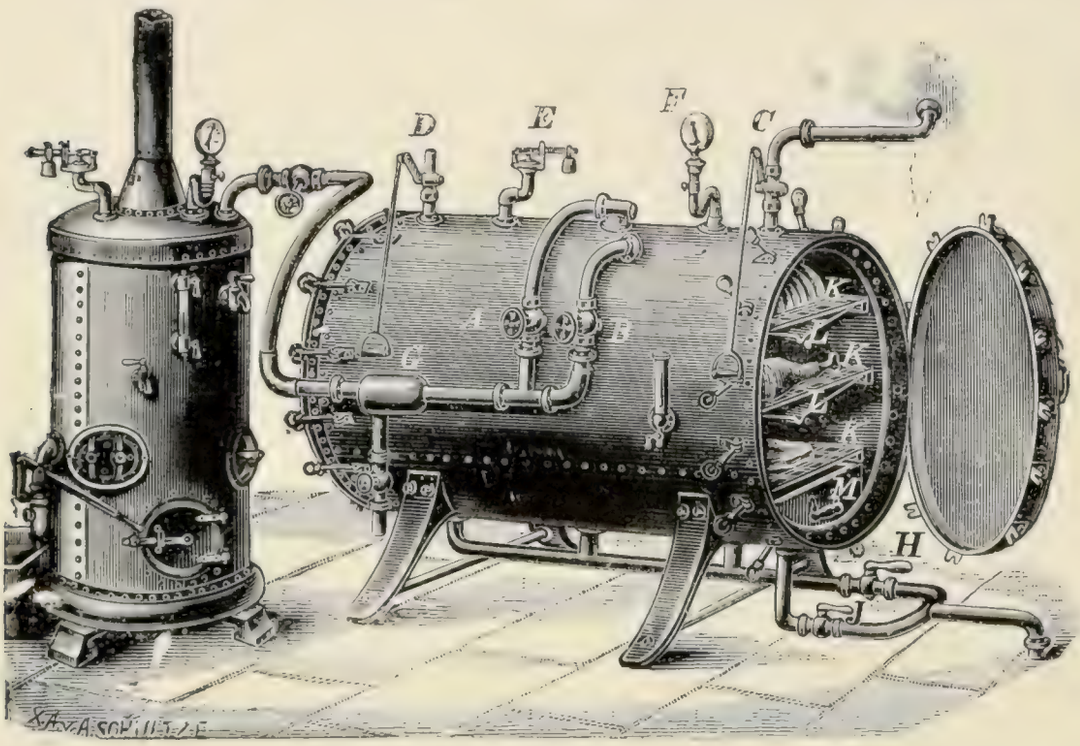

Fig. 144.

212°-248° F. The meat is made *absolutely* germ-free by this process, and is thus rendered suitable for human food, while it suffers *no* loss in nourishing qualities, but is very tasty and juicy, instead of being as insipid as when boiled.

1. The first of such apparatus to be constructed was the Rohrbeck patent meat disinfector, which consists of a jacketed cylinder, usually 3ft. 3in. long and 3ft. 3in. diameter (other sizes are 4ft. 7½in. × 4ft. or 6ft. 6in. × 4ft. 6in.) The smaller apparatus is furnished at the ends with one door; the larger with two, which are airtight when shut. In the cylinder are three or four iron shelves, which can be drawn in and out, and the piece of meat placed on them, 4in. or 5in. thick, and 7 lbs. to 14 lbs. in weight. There is a special zinc receptacle underneath for catching the dripping from the meat

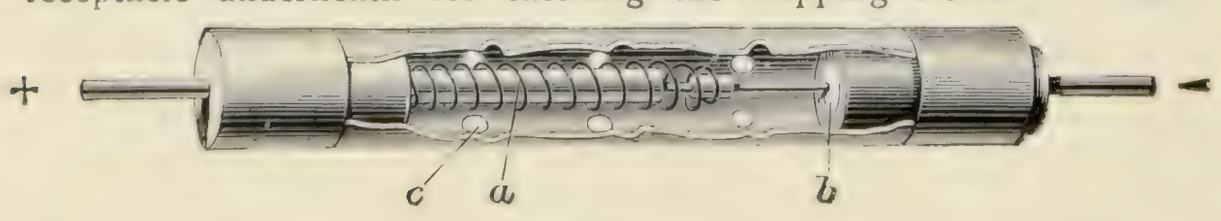

Fig. 145.

(fig. 144). The steam is led in from above, either direct into the cylinder or first into the jacket and then into the cylinder. If there is a valve to hold the steam in the jacket alone when required, the cylinder can be used as a drying chamber. The apparatus is provided with a steam trap for discharging the condensed steam, so that the process of boiling is steadily kept up, while air-spaces are formed in the meat, which are then refilled with the fresh steam

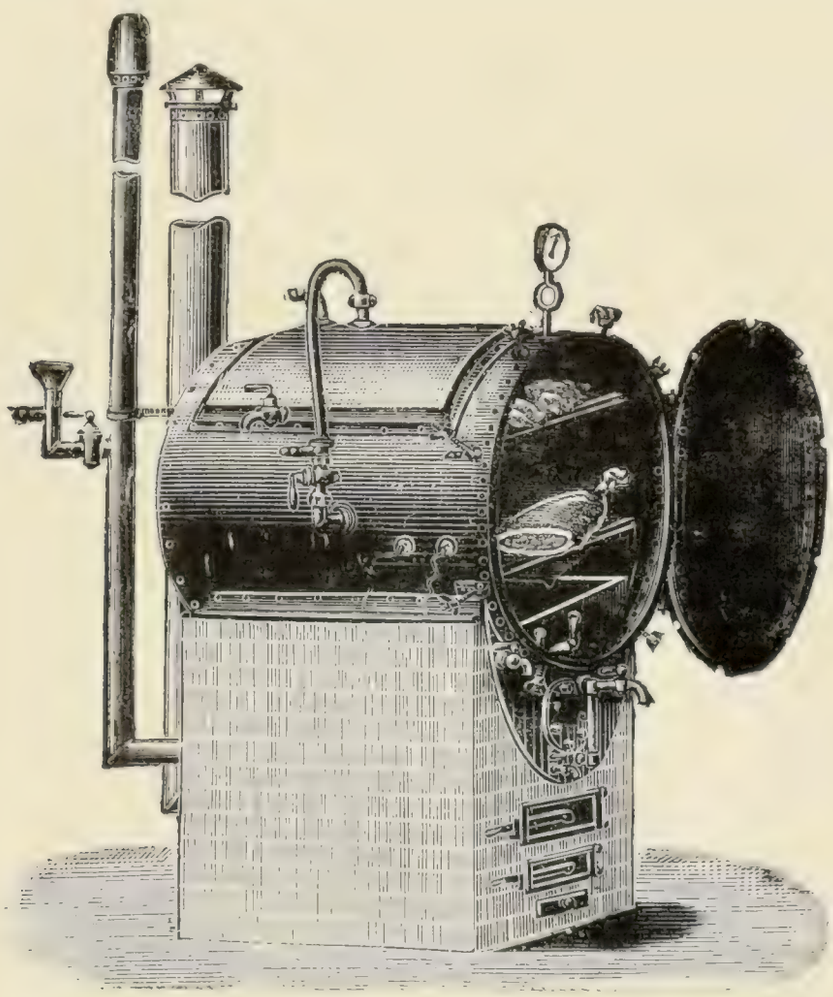

Fig. 146.

pressing in. This destroys all infectious germs in the meat, it being moistened all through and the albuminous substances coagulated, not only on the surface, but right through to the very centre of the thickest pieces. To ascertain whether the high temperature necessary has been attained, a signal pyrometer is put into the middle of the thickest piece, which works an electric bell on the outside of the steriliser as soon as the desired temperature is reached. This pyrometer (see fig. 145) consists of a metal casing in which one end of a spiral wire is separated from the

other end by an alloy melting at 212° F., and when this temperature is reached the alloy melts, and the contact is made by the action of the spring.

If the steam is only allowed to enter the jacket a drying chamber is formed in the cylinder, and the steriliser will then serve for the *destruction* of such meat as is unsuitable for human food.

From calculations made in Lübeck, this steriliser costs £65 to £250 according to size (100 to 1,000 gallons), and yields a return of five per cent., if a tax of 4s. be levied on an ox and 2s. on a pig.

Besides this large apparatus, there is now made one which is suitable for small businesses. This is placed over a furnace, and can be fixed up wherever desired. The apparatus illustrated in fig. 146 (page 331) and fig. 147 (page 333) are of this nature. The former takes up a space only of 4ft. 6in. × 3ft. 3in., and costs from £30 to £60, according to the size of the interior. Inside, these are fitted similar to the larger apparatus.

2. The steriliser of Lambert and Poucin is constructed on the same principle. This can be employed (1) as a meat steriliser (2) as vessels for the purpose of converting meat into material to be used industrially, (3) and to manufacture meat into cattle food. But it must be pointed out that two separate apparatus are strictly required for carrying out these three operations, as one apparatus should be *exclusively* used for the disinfection of such meat as is destined for human consumption.

The apparatus costs from £360 to £400, and can be made stationary or portable.

3. In the meat steamer of Rietschel and Henneberg (fig. 148, page 334), a temperature of about 248° F. is obtained by means of saturated steam at 12 lb. pressure, care being taken that the steam from the boiler itself, which is often not very clean, does not come into direct contact with the meat, for then the condensed water would be absorbed by the meat, and get mixed amongst the valuable extracts, and thus be useless for returning to the boiler.

The apparatus consists of the actual boiling vessel *a*, which may be tightly closed by a cover *b*. The cover can be easily lifted by a chain and pulley and counter-weight, these running on the pillar *f*. The bottom of the boiling vessel *a* is jacketed, and the space between *c* is furnished with a steam pipe *d*, and the condensed

water outlet *e*. The other fittings are a safety valve *g* and a pressure gauge, the removable wire baskets *i*, the air-cock *k*, and the wash-out cock *l*.

The method of operation is as follows:

First the pan is filled with about two pailfuls of clean water until the bottom is quite covered; when necessary, spices are then added. Then the meat is sprinkled with salt and pepper, and put on the wire basket *i*, next the lid *b* is tightly fitted on, and by opening the steam valve *d*, the water is brought to the boiling point. The vapours rise and wash the meat, while simultaneously the air con-

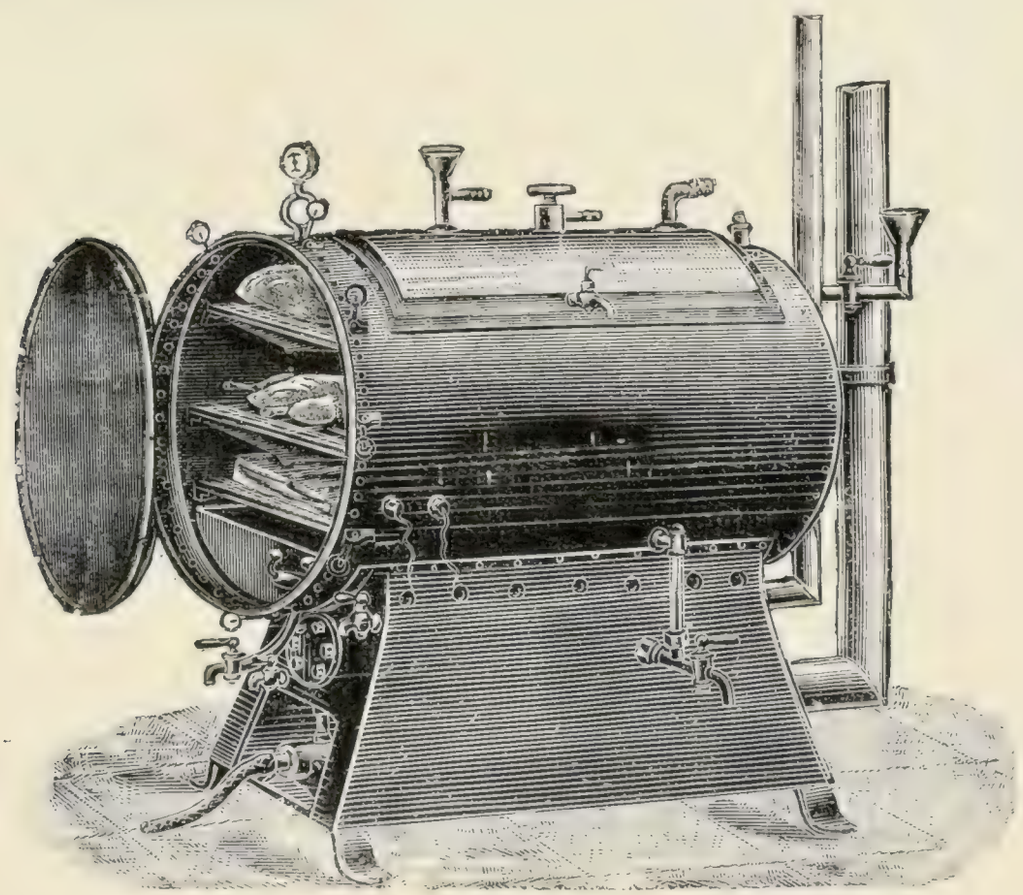

Fig. 147

tained in the boiler escapes through cock *k*. As soon as the steam streams through cock *k*, it is shut, whereupon in a short time the pressure in the boiler rises, this being recorded on the gauge *h*, the limit of 12 lbs. being maintained by the safety valve *g*. The meat now gets to a temperature of 242° to 282° F., and if kept at this temperature for a short time will soon be thoroughly cooked through. The juice that drips from the meat collects at the bottom of the pan, and when mixed with the water there forms a concentrated palatable meat essence.

When the process of cooking is ended, the steam valve *d* is closed, and after the pressure in the pan *a* stands at *o*, the air-cock *k* and the cover *b* are opened, but not till then. The meat is thereupon either removed from the wire-baskets piece by piece, or the basket is drawn out and emptied of its contents. For this purpose the

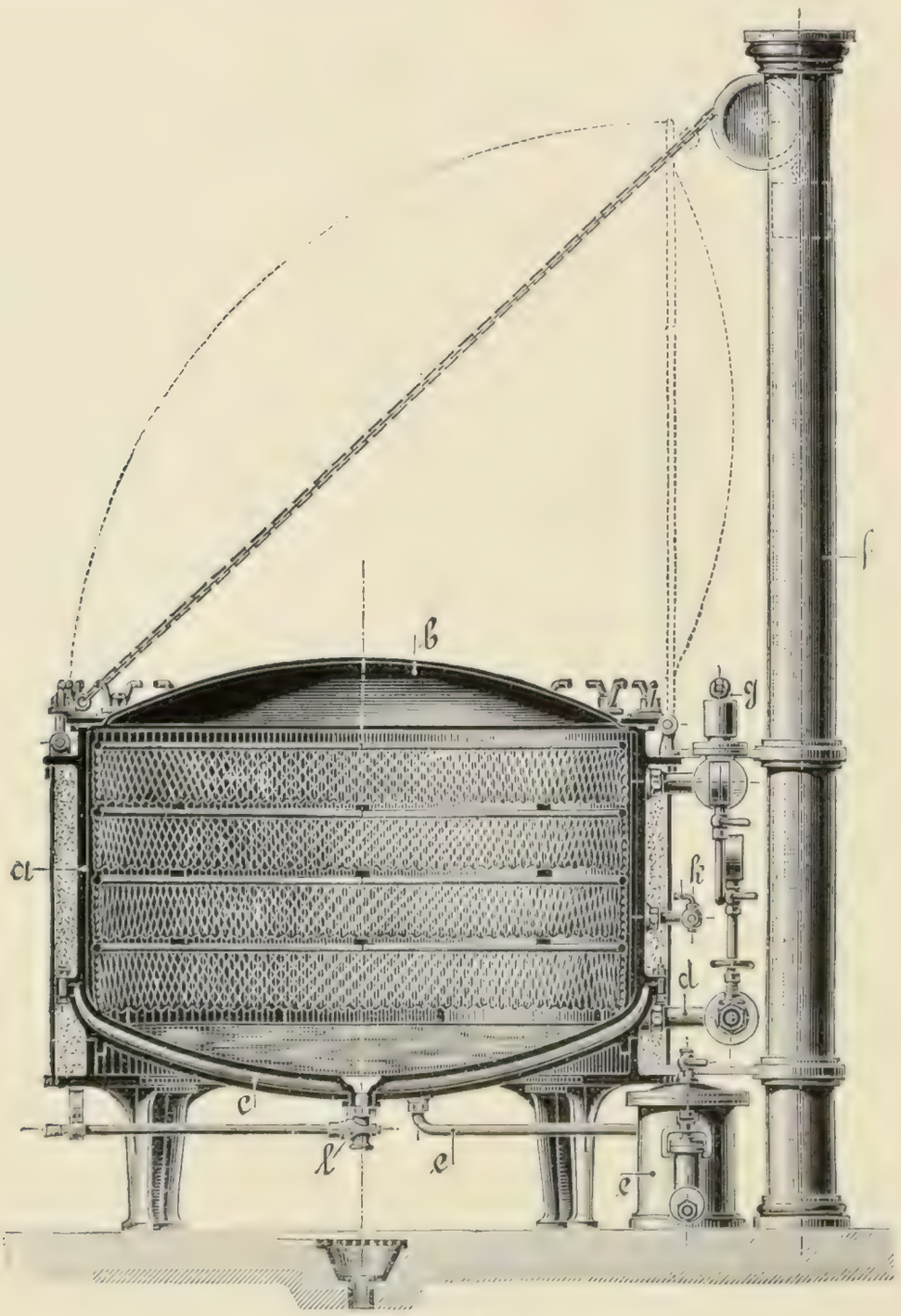

Fig. 148.

baskets are provided with handles. The liquid is scooped out by means of ladles. It is not advisable to draw it off by means of cock *b*, as thereby the fat would not be equally mixed throughout. It can also be used as a tallow-melting boiler, and costs about £60 to £85 to fit up this apparatus.

It is in use in Danzig, Freiberg, Kattowitz, Röthen, Leipzig, Neunkirchen, Potsdam, Quedlinburg, Spandau, Stettin, Stolp, Wesel, Zeitz, and Zwickau.

4. The meat steriliser of Rud. A. Hartmann. As is shown in figs. 149 and 150, pages 336 and 337, this consists of a cylindrical vessel *a*, with a tightly closing lid at the front *b*. The wider part of the vessel is provided with a steam jacket *c*, which is fed by the steam-pipe *d* leading from the steam boiler. The water condensed in jacket *c* is led off by means of the steam trap *e*. Inside the vessel *a* there is a partition *f*, which rises from the bottom and runs across from side to side, and forms a receptacle for the water, which is heated from underneath by the steam jacket. The water to be vaporised is run in until the heating-surface (*c*) is covered. The meat to be sterilised is then put into the apparatus by means of perforated zinc baskets *i*, and the lid *b* is shut. By the opening of the steam valve *d* the water inside is brought to boiling point, and during this time the cock *k* in the lid is left open, so that the air escapes from the interior, and gives place to the steam. As soon as the steam rushes out of the cock *k* the apparatus has had sufficient air removed from it, and the cock is again turned off. After a short time the steam given off by the water rises in pressure, which is duly recorded on the gauge *g*. As a rule, it is advisable that this pressure be regulated by means of valve *g* to 8 lbs., whereby the temperature of the steam will be 235° F. But there is no reason why the steam-pressure should not be raised to 15 lbs. when required, when a temperature of 250° F. will be attained.

By means of the steam which fills the whole sterilisation space equally, the meat in the baskets *i* is heated right through to the interior. The fat thus melted and also the juice that drips out get mixed with the water and form a most palatable bouillon, which is either ladled out or run out through cock *l*. The sterilised meat is taken out of the baskets *i* on the opening of the lid *l*, and can then be offered for sale right away. In appearance it corresponds exactly to meat boiled in water in the usual way; but it is pleasanter to the taste on account of the greater quantity of juice it contains.

The apparatus can also be used for melting fat. The price ranges from £60 to £140 according to the size of the baskets, which may hold from 60 to 300 gallons. The largest apparatus (fig. 148) differs

from the others in that the baskets for holding the meat can be pushed straight into the small steriliser, while in the large size a truck is required which is *wheeled* into the apparatus. The rails outside the steriliser are arranged so that they can be turned up into the position shown in the illustration by the dotted [lines] and arrows,

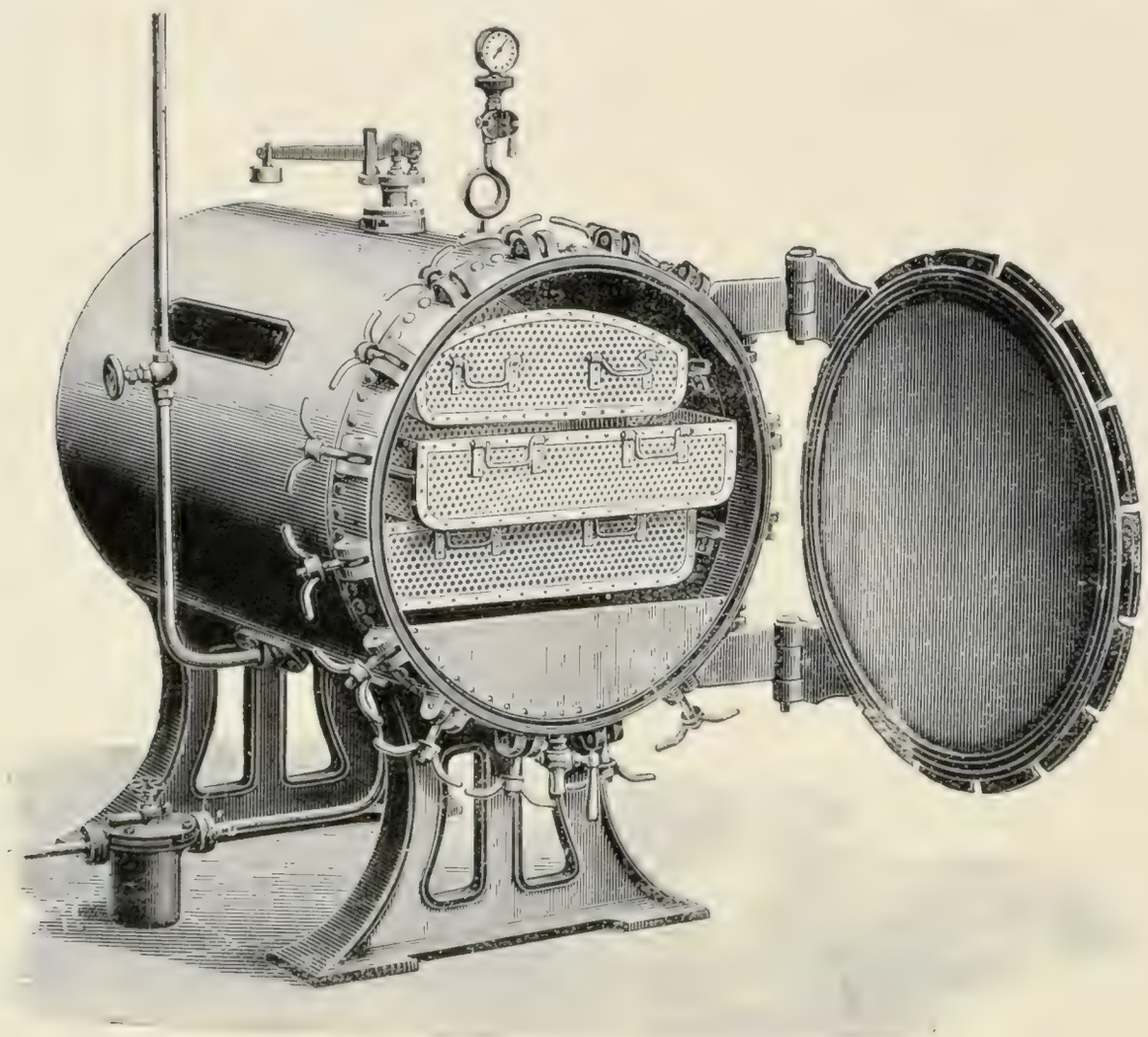

Fig. 149.

and then the door is shut. This steriliser has been fitted up in Breslau, Elbing, Emden, Eschweiler, Glauchau, Greifswald, Hamburg, Hanover, Carlsruhe, Cologne, Konigsberg, Köslin, Küstrin, Neustrelitz, Nordhausen, Pasewalk, Recklinghausen, Staigardt, Stralsund, Strasburg, and Wittenberg.

5. Budenberg's disinfector serves a *double* purpose just like the Rohrbeck apparatus. It can be used for both boiling and destroying meat, and is fitted up in the slaughterhouse at Dortmund. A communication from the director of this town shows that this apparatus is filled in the same way as the others. If it is to be used for industrial purposes, the pressure is brought first up to

8 lbs. and then is increased to 37 lbs., and kept at that for three or four hours, when the limewater and fat will be found to be completely extracted from the meat. The remaining contents are dry and easily destroyed. The loss of weight is from forty-five to fifty per cent.

The apparatus is worked at only 8 lbs. for meat-steaming. The meat thus remains juicy and has a pleasant odour. The thermometers inserted into the centre of the pieces of meat show a temperature of 212°-215° F.

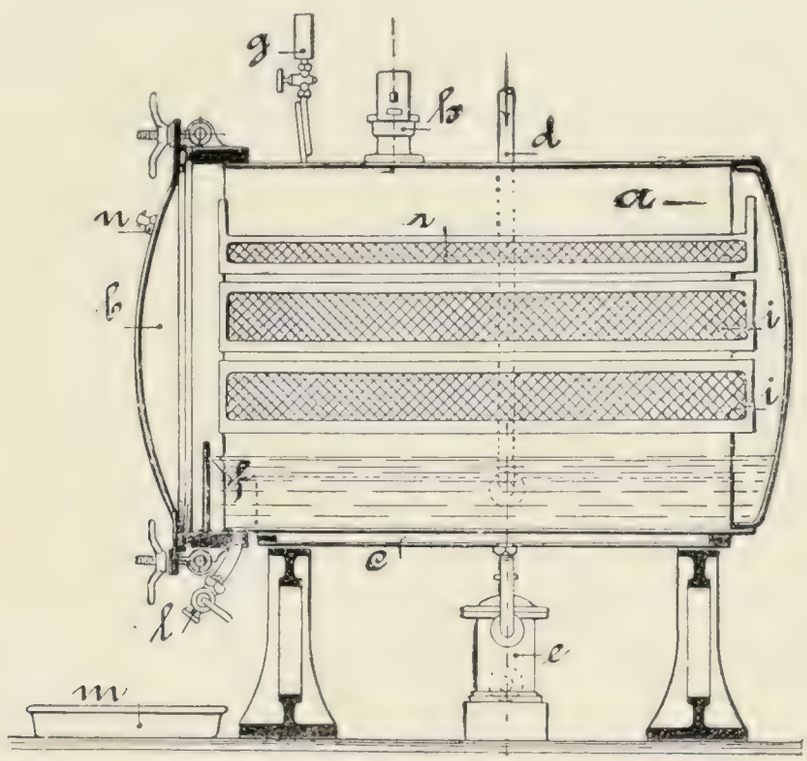

Fig. 150.

With this machine the income (fat, bones, etc.) is £985 2s.; expenditure, £625; balance, £360 2s.

Loss of Weight by Steam Sterilisation.—As to the loss which meat suffers from the above methods, experiments have been made on the various apparatus. The following average figures have been obtained: Beef, 44·45 per cent.; pork, 36·63 per cent.; mutton, 43·16 per cent.; veal, 42·4 per cent. The higher the temperature the greater the loss.

Experiments with Meat totally Unfit for Consumption.—According to the regulations laid down in par. 10, Lib. 17 II. of the General Land Laws, and par. 6 (*f*) of the law on police manage-

ment, 11th March, 1850,* the magistrates are responsible for the life and health of the public.

The regulation of the magistrates, that all meat which according to the opinion of the slaughterhouse experts is unfit for human consumption should be destroyed or technically steamed down for other purposes, is based on this law.

A decision of the Supreme Court of the Realm (14th October, 1893) decides that "this regulation is fully applicable, as by bringing an animal into the slaughterhouse it is assumed that it will be

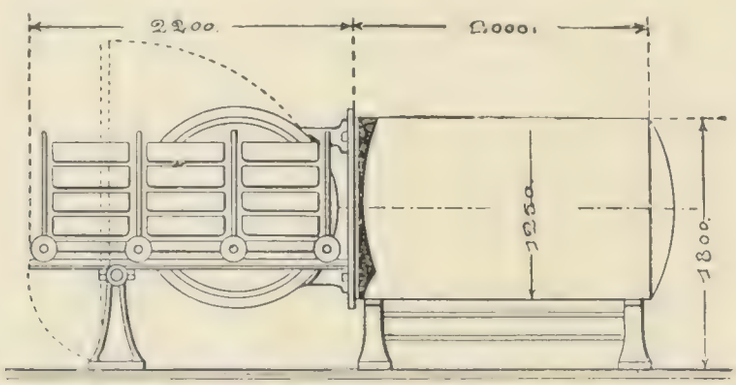

Fig. 151.

prepared into articles of diet, and thus offered for sale, and it is also presupposed that by the eating of unfit food human health will be endangered. To prevent this the police are quite entitled to make all necessary regulations."

According to a decision of the same court (4th June, 1897), the police are not obliged "to allow a person whose meat is confiscated because it is unfit for human food to remove it, and use it for industrial purposes; indeed, they are instructed to the contrary, *to destroy the meat which they retain.*" The safest and most economical mode to adopt in small institutions with a limited income is burning.

*Par. 6. Police regulations include laws regarding—

(*a*) The protection of persons and property.

(*b*) The order, safety, and control of the traffic on the public streets, ways, and squares, bridges, tow-paths, and waters.

(*c*) The market traffic and the public offering for sale of articles of diet.

(*d*) The control of large public crowds.

(*e*) The public interests with regard to the reception and lodging of strangers; wine, beer, and coffee-shops, or other arrangements for the dispensing of meat and drink.

(*f*) *Care for life and health.*

(*g*) The prevention of fire in buildings, also the supervision of all trades and undertakings injurious or dangerous to the community.

(*h*) The protection of fields, meadows, woods, plantations, vineyards, etc.

(*i*) Everything else which must be regulated by the police in the special interests of the community and their belongings.

For this purpose arrangements must exist in the slaughterhouse either for the total destruction or the industrial use of the confiscated goods. In every case care must be taken to prevent the spread of any infectious germs contained in the meat, even when it comes into the market under the name of "dog food."*

In this respect the managers of some slaughterhouses are very careless, some rejected organs being simply thrown into the dung-pit or carted away in the manure waggons. In other slaughter-houses, again, the confiscated goods are kept in barrels, and are then carried away by the knacker.

There is a most extraordinary regulation in the police enactment concerning the use of the public slaughterhouse in Remscheid (20th October, 1890, par. 22), adjuring the proprietors to see that *all unusable pieces of meat of every kind* be chopped up small, so as to be easily *buried!*

In Saxony it is prohibited by law to throw on to, or to bury tuberculous portions of meat in, dung-heaps, etc.

In the last few years a great number of cases has proved how little security is offered by the handing over of carcases, etc., to the knacker.

In place of these hygienic objectionable methods the *burning* of confiscated goods has been adopted in most slaughterhouses; and wherever no special arrangements have been made for industrial utilisation, these are simply thrown into the boiler furnace. The disadvantages of this mode of procedure are that all the confiscated goods which might perhaps be otherwise utilised are destroyed with the bad meat; that a certain quantity of fuel is necessary for this useless process; and that the furnace itself suffers thereby. According to the opinion of an inspector, "boiler furnaces are not erected for this purpose nor are they suitable. The great quantity of water, nitrogen, etc., contained in the meat in every case causes the formation of destructive gas products, which have a penetrating and highly unpleasant odour. The more meat there is burned in such furnaces, the more gases are formed; if there is a favourable current of air these may possibly be carried off

*On this Ostertag says: "The practice of some persons who traffic in meat injurious to health under the name of 'dog food,' must not be disregarded; for it is doubtful if it will keep. Its questionable utilisation is punishable according to par. 12 of the law of 14th May, 1879," etc., etc.

without annoyance to the community; but if there is no wind, or if the air is heavy, they immediately sink."

These inconveniences are more evident in a boiler with internal flues—a *Cornish boiler:* they are not so noticeable in a *tubular boiler*, as here the conditions are different; but still, such a method is injurious to it also.

In England and America furnaces have long been in use under the name of *destructors*, in which not only dead meat but street sweepings are burnt.

About threequarters of an hour is necessary for a thorough combustion, when 8 lbs. to 10 lbs. of white ashes is all that is left of 2 cwt. of meat.

Hofbaurath Schaller has constructed a meat-consuming apparatus for the slaughterhouse at Gotha on the principle of making use of the hot smoke-gases of the boiler furnace. A small heating chamber is fitted over the flue, through which the smoke and gases from the steam boiler pass to the chimney, and can be brought into direct contact with the flue beneath by means of two cast-iron dampers, so that in cases of necessity they can be led into the hot chamber, and then employed to consume the dead meat hanging there. This chamber need not necessarily be over the flue, it can also be alongside of it. The apparatus should only be used in those cases in which the bodies of *diseased* animals are destroyed, as the draught in the chimney is disadvantageously affected when this apparatus is used. It is only of late that the latter fact was discovered, and since then the heating chamber has been disconnected.

While in this apparatus the destruction of the meat was effected by the smoke-gases, this is done direct by fire in making use of a consuming-stove, in which the portions to be consumed are first dried in a collecting vessel and thus made ready for the actual consuming process, when they afterwards sink gradually down into the furnace for further consumption by fire.

The refuse can be thrown in from above by the lid or else from behind or from the side (fig. 152). This first passes into a perforated firebrick arch, and from thence into a horizontal continuation of the same. Between the chamber and the furnace a dividing arch is put in, on to which the dried material falls, so that it can be pushed

into a collecting pit. This arrangement prevents the working of the furnace being interrupted.

The cost to fit up this apparatus amounts, as a rule, to from £90 to £112, including builders' work.

The advantage of this apparatus is that great quantities of infected material are quickly and thoroughly destroyed without any annoyance to the neighbourhood, while at the same time smaller quantities may be made innocuous by throwing them provisionally into the collecting pit, and there storing them up, until enough material is gathered to consume altogether. According to a com-

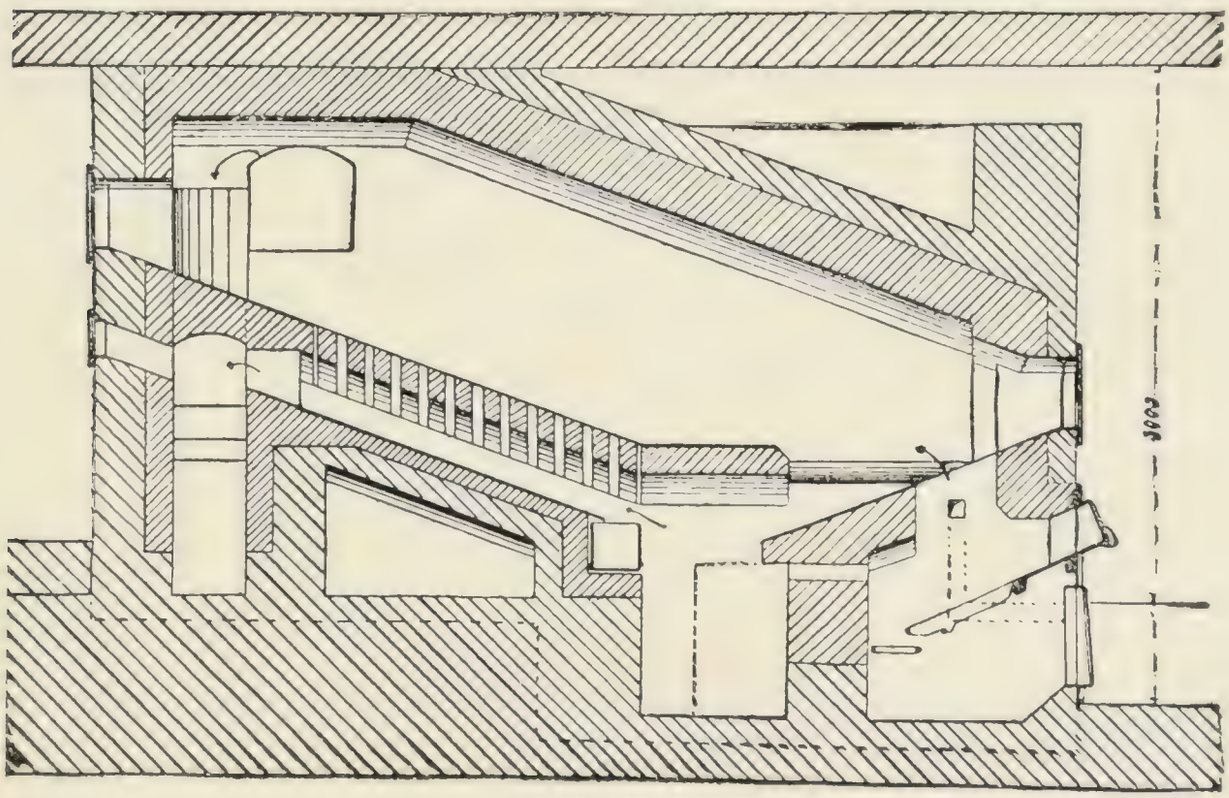

Fig. 152.

munication from Director Roguer, of Nüremberg, the apparatus erected there destroys about 20 cwt. to 25 cwt. weekly. 7 cwt. of coal are necessary for the destruction of 15 cwt. of meat, while seven hours are necessary to consume the meat completely.

The manure from the stalls of diseased animals is also burned in this stove.

In the slaughterhouse at Liegnitz there is a similar apparatus, in which 120 cwt. are burned annually, 8 cwt. of coal being used to effect combustion.

The return yielded for this proportionately large quantity of coal in manure is so trifling that it is quite out of the question to adopt

this method; besides, the ashes obtained only contain phosphoric acid and potash, while the valuable nitrogen is all lost along with the organic matter. On account of this waste in otherwise valuable material, this method, although *preferable* from a *sanitary point of view*, is *too costly* for it to find general use. Technical knowledge in these days requires that in dealing with dead animals, not only must there be a complete neutralisation of all injurious matter, but also the extraction of all useful material, at least sufficient to cover all the expenses connected with the destruction of the confiscated goods.

A method much in favour in earlier times was the *boiling* of the dead meat in open pans. The fat obtained thereby was skimmed off and the residue dried. Without having regard to the evil effects which resulted from the boiling and the ensuing drying—for instance, the poisoning of the air, and the difficulty in utilising the glue obtained by boiling, which so easily went bad—this method does not offer sufficient security that the poisonous germs are really killed, as only a temperature of 212° F. at the most can be attained. *Steaming* the dead meat, which has almost everywhere superseded boiling, is attended with quite other effects. The utilisation of the separate parts is accomplished here by chemico-thermic means in this way—the bones and soft parts are broken up by means of a rolling-mill and then put into iron cylinders, 6ft. 6in. to 9ft. 9in. high and about 3ft. 3in. in circumference. These are called digestors, and are always connected with the steam-boiler. After the vessels are firmly shut down, the steam is allowed to act at an atmospheric pressure of 45 lbs. for about five or six hours. Hereby the fatty and glutinous substances are thoroughly dissolved, and at the end of the process the solution of glue is led into a clarifying-tub and thence, when clear, into a condensing vessel; the fat is run off into clarifying pans, where it is cleansed by various chemical and mechanical means, and ultimately converted into machine-oil and into soap-boiler's fat. The contents of the digestor, remaining after the removal of the fat and the glutinous solution, are then ground down with the coagulated blood in a machine, dried in a drying chamber, and finally ground to a fine powder and run through a sieve. The powder so obtained makes a valuable manure. Not only is this method exceedingly tedious and troublesome, but it is also an annoyance to the immediate neighbourhood on account of the

foul vapours caused by the dissolving of the fat and the gelatine, particularly should the carcases be very much decomposed to start with. Then there is the question of expense—the fleshy portions being weighted with thirty per cent. of water, and thus requiring a protracted and costly drying process. These disadvantages are almost overcome in the apparatus lately constructed and already in use in many places, and the results have been arrived at in various ways. But while the principal product obtained hereby—"animal meal" or "meat guano"—was previously only used as manure, some time ago the experiment was made as to how it would suit as fodder on account of the great proportion of nourishing properties which it contained. This idea was suggested after the fall in price of artificial manure, and probably arose from the fact that a similar product—the dried and ground refuse from meat-extract manufacture—was bought up by farmers and used with good results as strengthening food.

Three meat fodder meals, of foreign manufacture, largely used in Germany are:

1. Liebig's meat meal, which is prepared in South America from the refuse of the meat extract manufacture, contains 70 to 75 per cent. raw protein, and 18 to 20 per cent. fat.
2. Ohlendorf's meat meal, which contains 80 to 82 per cent. raw protein, and 8 to 10 per cent. fat.
3. Spratt's Prairie meat-meal.

The price of the two first meals, of which 100,000 cwt. are imported into Germany annually, amounts to about 10s. or 12s. for every cwt., while the third commands 25s. per cwt.

Experiments with a view to make the home product into a fodder meal met with but little success, because the trade refused to deal with goods the *origin* of which had so much odium attached to them. It could not be gainsaid that the material had been freed from all infectious matter during the long-continued period in which it was subjected to a high steam pressure (45 lbs.—265° F.), nor could it be denied that lengthy experiments made in feeding large and small animals on this fodder showed anything but the most favourable results. The prejudice against it was too great to combat, and, in fact, was partly founded on the indisputable fact that *few* knackers' yards are provided with such irreproachable apparatus as to render it absolutely safe to use fodder made by

them. On the other hand, it is perfectly reasonable that prejudices of a century's standing against knackers' yards and their belongings cannot be removed in a day.

As the trade could not be reached, fish breeders and other consumers were dealt with direct. The recent revival in fish-breeding—and there being no prejudice to this method of feeding—coupled with the favourable results obtained, maintained the continuous use of meat-meal for this purpose. The Hamburg magistrates deserve our heartiest thanks for the pains they have taken to make known this home meat-meal, and to them its increased sale is chiefly due, for they have been untiring in their energies to bring about the co-operation of the various interests. In the Berlin Industrial Exhibition of 1896, too, the products of their knackers' yard were made widely known and accessible to all. Should the meat-meal from the home knackers' yard take the place of foreign goods, it will only be because the *home* meal is just as suitable for strengthening fodder as the latter.

The following analysis of the Hamburg fodder meal was made at the testing-station of the German National Agricultural Society: 5·59 per cent. water, 94·41 per cent. dry material, 18·16 per cent. ashes, 76·25 per cent. organic substances, 8·97 per cent. nitrogen, 56·06 per cent. raw protein, 50·56 per cent. digestible albumen, 16·75 per cent. fat (ether extract).

Of one hundred parts of protein, ninety-two were in this case digestible. The quantity of ash is explained thus: The animal meal contains the bones, muscles, and sinews, etc., of the animal as well as the meat. The following opinion, given by the Fishery Inspector, is of value:

"Although the quantity of raw protein and digestible albumen is not so great as in Liebig meat-meal, still it must be acknowledged that the above product contains the necessary nourishing salts, particularly lime, sufficiently pulverised—an advantage which the Liebig meat-meal has not got."

Finally, of course, as the quantity of nourishing substances is inferior, the price is considerably less.

According to the report of the Hamburg magistrates, the products obtained from the knackers' yard there have been sold to an agriculturist, F. Hoesch, who has experimented with it on his pigs.

The following remarks may be made on the results attained: Twelve pigs of almost the same age and the same appetite were chosen. Three were fed on (1) barley; three on (2) clover; three on (3) chaff; and three on (4) meat-meal (blood-meal). The cost for the four groups was as follows: (1) 86·72; (2) 86·72; (3) 87·91; (4) 78·27. At the end of the experiment the weight of each group was as follows: (1) 386; (2) 376·5; (3) 368·5; (4) 379·5. These results show that barley is the best fodder, and that the products of the knackers' yard come next. Other experiments showed that the latter was run very close by flax-meal, which is cheaper, but foreign meat-meal, which is dearer, did not give such good results.

The Hamburg knackers' yard has also supplied an important pig-breeding establishment with large quantities of their meat-meal. The breeder reports that "this meat-meal is a healthy and suitable means of supplying the albumen and fatty matter lacking in grain fodder. They were fed in the exact proportion as other fodder, and with *important results*. The taste of the meat of *those animals fed plentifully on this fodder was always fine*." Recommendations of the same nature are to hand from other quarters. The animals soon get used to the new fodder (within a week). Professor Lehmann, of Gothingen, says as follows: "The animal meal of home knacker's yards can well compete with foreign meat-meal if the purchaser *does not take exception* to its origin. He takes *no exception to the foreign goods*, although there are *on no account* any reasons for supposing that its preparation is entirely unobjectionable, whereas the knacker can clearly certify that his preparation is properly sterilised. Still the purchaser in general evinces great repugnance to the knackers' goods, although he has no proper reason for it.

"To remove this prejudice should therefore be the aim of every district council, which should work in sympathy with the knackers' yard and its further development."

Unfortunately, in the last few years the price of the main product in this industry—the fat—has diminished one-half, so that not much is to be obtained from this source, especially as the confiscated goods are mostly very lean. But as in the construction of various new apparatus weight is laid on the preparation of *glue*, a tolerably good return can be obtained from this industry. On page 346 a

Town.	Apparatus.	Raw material cwts.	Number of times charged during the year.	% of product in			Chemical analysis of the meal.			Price obtained per cwt.			Revenue from apparatus.	Purpose for which meal is sold.	Remarks.
				Fat.	Meal.	Glue extract	% Nitrogen	% Phosphoric acid.	% Potash	Fat.	Meal.	Glue extract			
Barmen	Podewil's	2,010	231	1·00	13·27	—	8·25	5·50	1·30	12·6	5/-	—	1·5 %	Manure	
Hamburg ..	..	10,071	367	9·44	23·11	—	8·187	6·02	—	20 /- 21 /-	6/6 7/-	—	—	(Feeding) Meal	
Kattowitz	..	900	156	40·00	10·00	—	—	—	—	18 /-	6/6	—	—	Fish food	From offal, etc, 20 to 25 % meal; blood was not used.
Britz b. Berlin	Kafill	—	—	5·00	18·00	8·00	9·15	9·75	0·28	20/ 23 -	6/6 7/6	6/- 8/-	18 %	Manure	
Danzig .	..	8,600	—	4·42	7·61	—	9—10	9—10	—	16,6	6/-	—	no surplus	Fish food	
Emden .. .	Hartmann	500	100	3—18	12	—	—	—	—	16/-	5/-	—	fairly good	—	Blood was not used.
Konigst i/P. ...	..	3,000	—	7·68	12·90	5·17	8·57	12·04	0·31	13/-	6 -	5/-	9 %		
Magdeburg ...	..	2,000	104	5·3	12—13	—	8·76	6·95	—	18/-	4/3	5/6			
	Otto	—	—	18—20	21—23	6—8	7—9	9—11	0·3	14/- 20/-	6/- 7/6	5/- 6/-			

Fig. 153.

table is given showing the results obtained in some places with these apparatus.

What is said here of knackers' yards applies also to the establishments existing in public slaughter-yards for the industrial use of confiscated goods, etc. The better utilisation of these products and their corresponding returns makes the business all the surer. If the products obtained paid better, not only could the owners of confiscated animals be paid higher compensation dues, but it would also have the effect of inducing the managements of small slaughterhouses to resolve to fit up appliances for the rational utilisation of refuse—blood and confiscated goods, especially now that such apparatus is always becoming cheaper. Then the many abuses in otherwise excellently appointed slaughterhouses would disappear.

1. *The oldest apparatus of this kind is the Kafill Disinfector.* In its simplest form this was first constructed in 1884 by the manager of the Antwerp slaughterhouse and improved later by a Berlin engineer, Mr. Henneberg. This apparatus was first fitted up in 1893 in the private knackers' yard of Britz, in Berlin, and then experimentally in the slaughter-yards of Carlsruhe and Spandau, with considerable alterations in 1895. These are still in use, as are others in Danzig[1] and Elberfeld.

The Kafill disinfector (fig. 153) consists of three vessels, A, B, and C. The vessel B is really two separate cylinders, B_1 and B_2.

The vessel A, which serves for the reception of the raw material, consists of a jacketed cylinder, into the upper part of which a second cylinder of perforated metal is fitted, so that there is an annular dividing space of about three-quarters of an inch, formed between the two cylinders. Double sheets of perforated metal are fitted across in the inner cylinder, dividing the whole space into layers eight to nine

[1] In the Management Act for the Freibank and the Kafill disinfector in the municipal slaughterhouse at Danzig the following instructions are to be found as to the destruction of meat unsuited for consumption: (Par. 10.) Meat *unsuitable* for human consumption is to be weighed out and given to the official butcher by the person employed in the slaughterhouse for that purpose, along with the names of the *owners*, and the weight of the quantity of meat from each separate owner.

(Par. 11.) The destruction of the meat is to be effected by the Kafill disinfector fitted up in the slaughterhouse, which must be set in operation in every instance only by order of the manager. The destruction of the meat and the utilisation of the products obtained thereby (tallow and manure-powder) are arranged for by the slaughterhouse and cattle-yard management at the expense of the owners of the meat in question.

The various officials in the slaughterhouse office have to keep an account of the costs of the destruction, etc, of the dead meat and to credit it with the amount received from the sale of tallow and manure powder. Should there be a surplus it is to be divided amongst the owners of the meat in proper proportion, while if there is a deficit, this must be made up by the owners in a like proportion.

inches thick. In this way the steam admitted into the interior of A by the valves V and V_3, can act on the material by passing through perforations in the metal sheets, as well as by means of the perforations in the cylinder, so that the time necessary for thorough sterilisation, fat-removing, and drying is much reduced, and in cases of necessity the apparatus may be filled *twice in one day*.

The fat and glutinous water collect in the process of working at the bottom of the vessel A, from whence it passes by the valve V towards a second vessel, the receptacle B. In this there is an arrangement which prevents an emulsion of the fat and the glutinous fluid, and admits of a free separation of the fat from the glue. If the latter is let off into BII by the opening of cock h_1, then the fat remaining behind in BI can be readily run off. In BII there are arrangements for refining the fat into the finest quality.

As soon as the glutinous fluid reaches BII h_1 is again shut, and valves V_6 and V_5 are opened. These admit steam to the jacket of BII, and the fluid becomes vapour. The steam escapes through V_8, towards C, where it is condensed. This process does not consume any more time than the boiling process going on in A, so that when the latter is done, and the dry material has been taken out of A, the product called "barrel-glue" can be removed from BII by means of cock h. If the material is not sufficiently gluey, the liquid obtained can either be let off into the drains or evaporated in BII until dry. The refuse is then taken out of BII, by the manhole, and ground to powder along with the product out of A. The last vessel is the condenser C, which communicates with the vessels BI and BII, and also with A. This is provided with an easily opened cover near the floor, a water-gauge glass at the side, and a water nozzle inside. This condenser is for the purpose of condensing the steam which streams out of BI and BII, and also out of A at the beginning and the end of the working process. This steam is led to the boiler-furnace, where it is consumed. The condensed water is led off into the drains. The solid matter taken out of the vessels A and BII is put into a drying chamber, and must remain there about eight hours. It is a good thing if it is previously broken up somewhat in a vessel for the purpose. In large establishments there are special arrangements fitted up for the filling and emptying of the machines, so that as little labour is wasted in the proceedings as possible.

This apparatus is made in four sizes—1,150 lbs., 1,700 lbs, 2,700 lbs, 3,750 lbs. being the different capacities in which cylinder

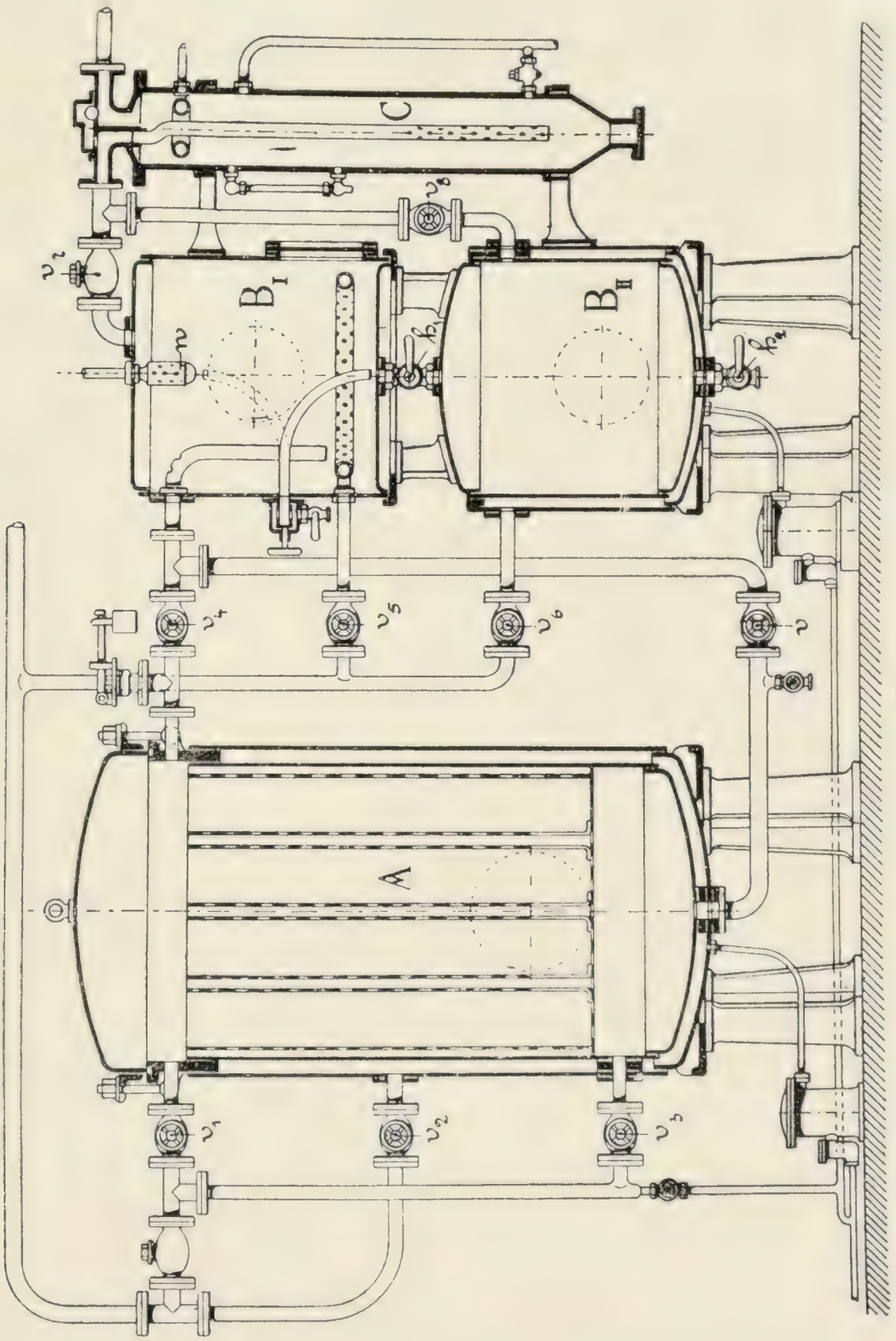

Fig. 153.

A is made. An apparatus of 2,700 lbs. capacity can sterilise, dry, and grind to powder 800 lbs. of raw material in eight to ten hours.

The coal consumed is about twenty-nine per cent. of the weight of the raw material.

According to the experiments that have already been made the apparatus shows good financial results, especially in large businesses.

2. *Podewil's System for Odourless Treatment of Dead Meat and Slaughterhouse Refuse* (see fig. 154, page 351). The first apparatus made on this system was shown at the exhibition at Augsburg in 1882. It consists of a strong horizontal cylinder capable of rotating, and having a steam jacket. The apparatus is filled and emptied by means of a manhole with an air-tight cover.

The process is as follows: The dead meat is cut up into large pieces on a movable dissecting table, and either thrown into the apparatus direct or by means of a shute. After the manhole is closed, the pieces of dead meat are steamed and disinfected under a pressure of from 60 lbs. to 90 lbs. by means of steam at 320° F., and after being steamed for from three to four hours, the fatty deposit that is formed is led into the fat separator through a pipe sloping downwards. For the process of drying, steam is led into the outer jacket, the drum is set in rotation, and a roller inside crushes and grinds the soft material, while all the free steam is sucked up and condensed, the uncondensable gases, as in the case of the Kafill disinfector, being led under the boiler furnace and consumed. After drying from seven to ten hours, the pieces of dead meat, including bones, skin, and horns, are ground to powder, and on the opening of the manhole the dry powder falls automatically into the sack standing underneath.

Meanwhile the specifically lighter fat is separated from the glutinous liquid in the fat separator. The former is run off into a cask; while the glutinous liquid is led back into the drum for the next charge, and is worked up along with the material there.

The fat-separator can also be used as a digestor for use in working with animals not cut up, and having anthrax or glanders. It is then fitted up under the manhole with a sieve bottom and the necessary pipes. The meat juice collected during the process of steaming is passed into the drum and dried there. The drying of the material in the digestor is also effected in the drum. Instead of this rather out-of-date method, the same firm has constructed a "tipping drum" for the utilisation of dead meat that has not been

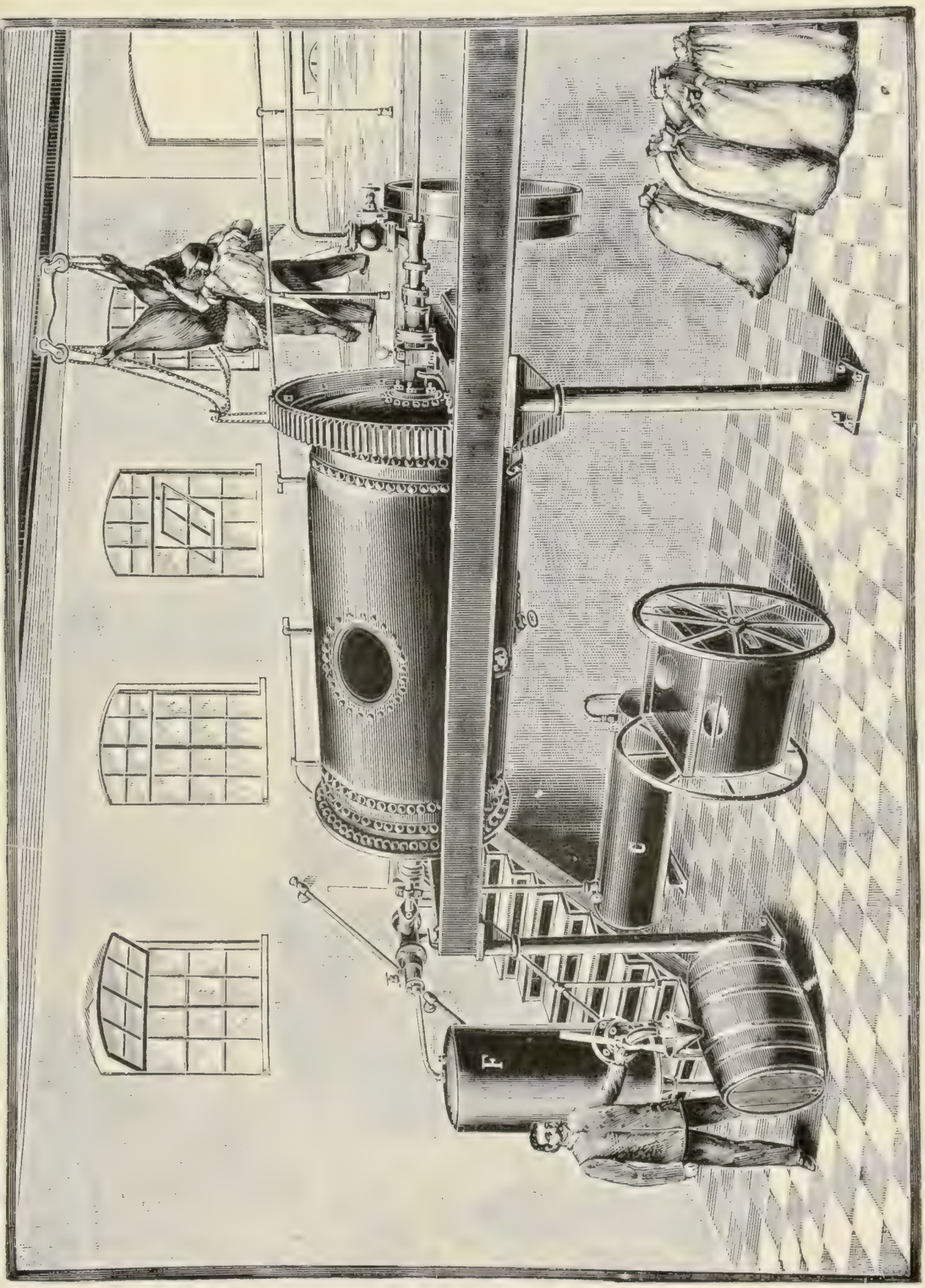

Fig. 154. THE PODEWIL "DESTRUCTOR" FOR DISEASED CARCASES.

cut up. This is furnished with a large cover that screws off and on. By means of adjustable trunnions the drum can be turned until it is perpendicular, the cover being uppermost.

The following advantages are claimed for the Podewil's system:

The dead meat remains throughout in the interior of the apparatus, which is air-tight, and thus all offensive odours are avoided.

Grinding goes on at the same time as drying, and under favourable circumstances, all the meat and bones being equally soft.

The two products obtained, dead meat-meal and fat, are immediately saleable.

As the whole week will not be consumed in grinding the dead meat, the apparatus can be advantageously made use of the remaining days by drying in it blood or other slaughterhouse refuse, or by employing it as a tallow-melter.

The apparatus is made in five sizes (750-5,600 lbs.), the smallest of these costing about £275 for the apparatus without accessories. The best regulated and most cleanly businesses will decide to have *two* apparatus of *smaller* dimensions instead of *one large one*.

The largest apparatus of this kind is to be found in the State Knackers' Yard at Hamburg, in every respect a pattern establishment. A similar apparatus is fitted up in the municipal dead meat destruction establishment at Munich, and also in Augsburg. In the district of Friedberg, in Hesse, in the year 1894, there was fitted up an establishment with two apparatus for the use of seventy-two country parishes. The cost to fit them up (inclusive of cost of ground, dwelling-houses, stabling, yard, and fittings) was £1,500 in all. Finally, Podewil's apparatus is in use at Barmen, Bentheim, Kottowitz, and various other slaughter-yards.*

3. *The Hartmann Extraction and Destructive Apparatus* can be seen working in the slaughterhouses of Breslau and Königsberg, and another apparatus of simpler construction for smaller businesses has been fitted up in Emden. In all these apparatus the material obtained after steaming and extraction must still go through special processes before it is ground and dried.

After several experiments, Hartmann has now succeeded in constructing an apparatus in which the drying and grinding of the raw materials follow immediately after steaming and extraction.

*This apparatus is fitted up in the United Kingdom by Wm. Douglas and Sons, Ltd., Putney, London.

The apparatus consists of three vessels—the actual extracting and drying apparatus, the receiver, and the vaporiser.

The extraction apparatus consists of a horizontal cylinder with openings for filling purposes, etc. In this cylinder there is a drum sieve, movable on its horizontal axis. The meat in this drum is kept in motion during the steaming process, whereby the duration of the process is made considerably shorter than when the dead meat merely rests within it.

For about two hours steam is admitted through two valves while the raw material is boiled down and freed from the greater part of its fat and of the water it contains. The liquids collect in receptacles for the purpose, the fat being received into one, the meat fluid into another. After two hours have elapsed the meat juice collected in the receptacle is driven into the evaporator, and here evaporated by means of a steam coil. During the following two hours the steam developed from the meat juice is made use of entirely for the thorough cooking of the meat, and for rotating the drum. While in earlier apparatus the thorough steaming of the meat required at least eight hours, by this process the period is curtailed to four hours, it being all the same whether it is filled with whole carcases or with single organs. Of course, these advantages considerably increase the productiveness of the apparatus.

After the steaming and extracting processes are completed one valve is shut, and the steam developed from the glutinous meat juice is led through another valve into the jacket. At this period the drum is set slowly rotating, and the steam given off from the raw material is sucked up through a valve into a fan. After a four to six hours' drying process, during which a movement of the dried mass is effected by means of the agitator, the raw material is converted into a powder ready for sale. At the same time the water in the vaporiser is evaporated, so that there only remains there the glue manufactured by the process. The clear water driven into the heating-jacket and condensed collects in the receiver.

While in other apparatus the steam developed from the glue is precipitated in a condenser, and then finally the unprecipitable gases are burnt in a special furnace, which entails a great expenditure of water for condensation and of fuel for the furnace. By this new process the steam developed from the glue water serves for the heating of the steam jacket in the extraction apparatus. Then the raw material

is dried by steam, which also is made to serve a double purpose. By a simple mechanical arrangement the extraction apparatus is turned on its axis, so that the opening *a* is made to face downwards, whereupon its entire contents empty automatically. The fat and the glue are drawn off and the distilled water in the receptacle is led into the drains.

As neither steam nor gas is allowed to escape into the open air, every development of evil odours is prevented.

The apparatus is manufactured in three sizes—of 1,100 lbs., 2,250 lbs., and 4,500 lbs. capacity. In all three sizes meat can be treated without any preliminary cutting up. The price of a complete apparatus (without accessories) amounts to £250, £350, or £500.

The apparatus has been fitted up in the knackers' yard at Sweinitz, and in several slaughterhouses.

4. *The Otto Apparatus* (fig. 155, page 355) consists principally of a disinfector A, receiver B, and a glue vaporiser C.

The disinfector A is a stationary steam-jacketed cylinder. In the interior of this there is a perforated drum moving horizontally on its axis, fitted with a roller inside. The material is introduced through the door *a*. If carcases are to be put in whole, the end covers *f* and f_1 are removed, and the meat is run in by means of a truck on rails. The material is cooked three to four hours in the perforated drum, the glue-water and fat being meanwhile extracted and allowed to flow into the receiver B by the overflow pipe *k*. Here the glue is separated from the fat. The former is driven through the valve *m* into the glue vaporiser C.

When the cooking process is ended, the steam jacket of the disinfector A is heated, while the steam is led direct to the interior. The perforated drum is set in motion by means of the driving gear *h* and *i*, whereby the cooked material is pressed through the holes in the perforated drum by means of the roller inside, while the external spiral acts as an agitator and comes into contact with all parts of the jacket. The vapours and gases absorbed from the disinfector by the help of the air-pump E during the drying of the powdered meat are next led through the feed-water tank D to be partly condensed, and led into the tank F for the condensation of the remainder of the absorptionable gases. In this tank there is running water. What is not absorbed here is led through a pipe

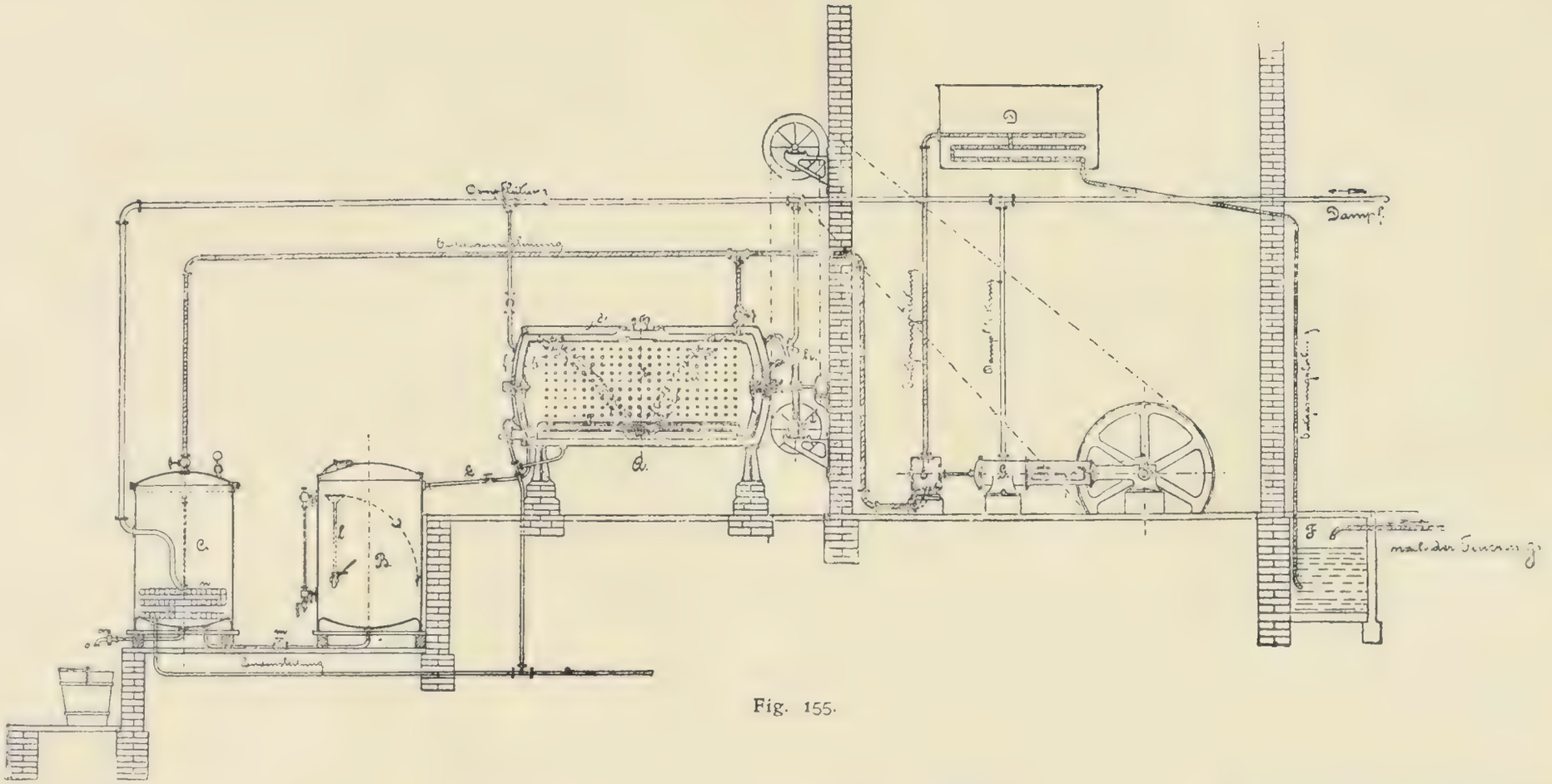

Fig. 155.

A Disinfector.
B Receiver.
C Glue-vaporiser.
D Feed water tank.
E Air-pump.
F Watertank for the condensation of vapours and gases.
G Steam engine.
a Manhole.
b Perforated drum.
c Travelling spiral.
d Steam heating jacket.
e Discharge-opening.
f f_1 Covers of headpiece.
g Roller for grinding boiled Material.
h Spiral for driving the drum.
i Machinery belonging to spiral.
k Overflow pipe for the extracted fluids.
l Key for throwing on fat pipe.
m Valve for feeding the glue-water to the glue vaporiser.
n Heating-coil.
o Cock for leading off the glue.

opening from just below the air-tight cover of the tank, and connected to the boiler furnace.

After the drying process is completed, the cover is removed from the discharge opening *c* in the disinfector, and the powder falls out automatically, propelled by the travelling spiral. The fat is taken out by means of the key C. The glue is run off by cock *o*.

Apparatus on the Otto patent is used in the knackers' yards at Altona, Hanover, Stargard, and in the slaughterhouse at Essen.

Finally, we must not omit the *Rübenkamp Dry Method*. This consists mainly of a drying chamber and a cage in the shape of a truck, divided into compartments, which is pushed into the drying-chamber laden with the material to be manufactured into powder. The meat is either hung on hooks in the various compartments, or laid on perforated sheets of metal, under which are vessels to receive the fat, this running into a collecting chamber below the truck, from where it can be drawn off. A number of pipes and drains are led into the drying chamber, which carry it to heated air, and through which the hot gases escape on their way to the chimney.

The gases and vapours arising by this drying process are absorbed into the furnace and consumed. Whether it is to be used afterwards for the thorough drying of meat or pieces of meat, blood, etc., for manure or for Freibank meat, the contents of the drying apparatus are treated with steam or hot air under pressure, and afterwards with more or less dry heat. The advantages claimed for this are—easy and cheap working, speedy completion of the process, and the prevention of bad odours.

The Claims of the Knacker.—By the use of these appliances the knacker is injured, unless other provision is made to preserve the privileges accorded to him in the laws of May 31st, 1858, and December 12th, 1872, and it is necessary, in order to prevent insurmountable difficulties, that every corporation resolving on the erection of a public slaughterhouse shall first decide whether the knacker is to have all the material that is to be destroyed or whether it is to be utilised in the interests of the public. For although the whole knacker business may be designated with truth as a hygienic anachronism, still the proclamation of April 29th, 1772, still holds good—that by it the cattle (exclusive of sheep) found "unclean" at slaughter fall to the knacker.

But while the Ministerial Rescript of May 11th, 1789, defines the term "rejected" as all meat unsuitable for further use by mankind, there is then no better description of the term "unclean" or tainted. But according to later decisions, this includes those animals "which after being killed exhibit such signs of disease that they might injure public health if used for consumption." This decision of the Supreme Court of October 8th, 1891, treats of trichinæ affected meat, but holds good of all other meat, which in the sense of par. 367 of the Penalty Law is "dangerous to health."

According to the verdict of the Provincial Court of Appeal at Stettin, of October 9th, 1893, the expression "cattle" is not to be understood as identical with "animals," but only to include certain species of animals, these being, as the proclamation of April 29th, 1772, makes clear, oxen and horses; for the proclamation always speaks in pages 1 and 2 in a general way of "rejected" cattle, of "tainted" cattle, and then in page 3 goes on to speak of fines and compensation-money only for foals, oxen, or steers, and for horses or oxen. Thus the expression "cattle" is identical with horses or oxen. Therefore the knacker is only entitled to fetch away large and small oxen and horses.

But in no case should such meat be considered as unclean or infected which is relegated to the Freibank—that is, "tainted in the sense of the Articles of Diet" law. For it is consumed—and certainly without injury to public health—and it is therefore all the same, whether by its sale a certain form—the declaration—be followed or not. The knacker has therefore only a right to such meat as is entirely debarred from human consumption.

In some towns endeavours have been made to settle the knackers' claims in some legal manner, and there are quite a number of decisions on this point. The Appeal Court at Magdeburg decided, May 9th, 1886, with regard to the knackers' yard at Genthin, that the privilege be accorded for the attainment of police purposes. The knacker should thus be allowed to exercise his calling in the interests of the police, and on no account for the *attainment of a private income.* He can only claim indemnification on account of a withdrawal of certain emoluments connected with his *service* and not the deprival of a *right.* It treats, therefore, only of a *personal concession*, the renewal of which must be expressly reserved to every fresh knacker attaining the position.

On the other hand, the Provincial Court of Appeal at Stettin enunciates the following principles in its decision of Oct. 5th, 1896:

The prerogative of the knacker, as the basis of the action for damages, is a subjective *personal right*, to be understood as a self-interested prerogative, as it does not follow from the privilege grounded on the prerogative that it is connected with the possession of a knackers' yard or is dependent on such. Such prerogatives are looked upon as unchangeable according to Prussian law, because they are treated, according to the historical course of the German law—as property. The disputed prerogative stands entered as such in the land register. It is therefore, according to par. 69 of the "Law on the Acquirement of Property," etc., of May 5th, 1872, to be judged according to this law as regards the sale and inheritance of the property, and also as to its being assessed and mortgaged. It therefore follows, without further argument, that its transferability has been put into practice. The plaintiff's right of tenancy can therefore not be objected to. The tenant, according to Prussian law, has a perfect right to make complaints against a third party. The plaintiff is therefore actually legalised to raise a complaint because of damages sustained by him in his right as a tenant.

The complaint is raised against the defendants (the corporation of the town) with perfect right, because they have deprived the owner of his privilege, and instead of notifying the knacker of the tainted meat, have informed the police. Therefore, it is of no consequence that the order issued by the defendants, and permitted by the district committee, concerning the inspection of slaughterhouse cattle in the municipal slaughterhouse at Stolp, of December 12th, 1892, and March 3rd, 1893, prescribes, in par. 4, the assigning of their cattle to the police officials. The regulation is issued and approved of without detriment to all the conditions of private rights. The rights given by means of the knackers' yard prerogative are therefore not removed by this regulation; *indeed, the corporation in question is all the more liable to the compulsory provision of knackers' yards in connection with their slaughterhouse business*, and is obliged to offer compensation in so far as they, in the course of their business, have gone against the privileges of the knacker, and have deprived the rightful owner of his cattle.

The knackers' yard is thus accorded the right to demand the handing over of all dead meat which is debarred from consumption,

and is consumed in the slaughterhouse, while, according to the verdict of the Provincial Court at Stolp cited above, only 6s. was formerly paid to the knacker for every ox or horse withdrawn from consumption in accordance with the rules laid down in the decree of April 29th, 1872. With regard to this point, the Provincial Court for Stettin, already quoted, has made the following decision :

"The proclamation lays down the fines which are to be paid as compensation to the knacker when depriving him of the cattle in question. By the laying down of these definite rules, the declaration to the knacker should not be circumscribed to the *higher* indemnification claims grounded on the general laws ; this would entirely contravene the aim of the mandate, but such amounts only should be settled hard and fast as, *under all circumstances*, and without proof of an injury, should be incumbent as compensation to the knacker. To make valid a proved claim for indemnification on a higher scale is, therefore, not forbidden by the proclamation."

The foregoing decisions show that legally nothing can be proved, but that the knacker is entitled without a doubt to all meat withdrawn from consumption. To prevent this, nothing else remains but to withdraw the privilege absolutely, and either to transform the knackers' yard, as suggested below, or to make a bargain with the knacker. As the first expedient is attended with many difficulties, an agreement with the knacker has been attempted in many towns, in consequence of which he either gets a definite compensation for each animal in the slaughterhouse falling to him, or he gets the hide (in Stolp, for instance), the meat then remaining in the slaughterhouse, and either destroyed there or technically utilised. In any case, the slaughterhouse management has the knowledge that there is no misuse of the meat or a chance of its coming into the market worked up into sausages, etc.

Besides this danger, knackers' yards of the old style bring both evils and unpleasantnesses in their train, and Böllinger rightly names them "institutions contrary to all police regulations," while Damman calls them "lurking-places for cattle diseases," for by the most untrustworthy and hygienically impermissible methods of technical utilisation, they become the breeding grounds of millions of microbes and vermin of all sorts, which form a frightful plague to the neighbourhood, especially when to this disadvantage a further is added—the often almost unbearable smell, so that in this

way air, water, and earth are poisoned. Proposals have therefore been made since 1878 by the Veterinary Council for a regulation of knackers' yards, and at the ninth session of the German Agricultural Council the following resolutions were passed :

"The German Agricultural Council declares for a uniform regulation of the knackers' yards in a like manner, as has been effected in other places by the Epidemic Laws of the Empire, it being on sanitary, veterinary, police, and economic grounds a crying necessity.

"I. If a law concerning these is issued, special regard must be paid to the following points :

"(1) That the police notification made by the cattle owners be not limited merely to animals that have died of an epidemic or are suspected to be diseased, but that it be extended to the necessary slaughter of all large domestic animals used for economic purposes, inclusive of sheep and pigs.

"(2) That as high a value as possible be put upon the dead beast, in the interests of the owner, while having regard to veterinary and police interests.

"II. The compulsory and interdictory laws regarding knackers' yards still existing in some states must be withdrawn."

Such compulsory and interdictory rights now exist principally in several Prussian provinces, and are subject to the decrees in the Prussian laws of December 17th, 1872, concerning the abolition of the special privileges granted in connection with the knackers' yard industry.

In this law the compulsory and interdictory rights are declared as capable of being abolished, but merely on the motion of those under an obligation. This resolution is openly issued in favour of the responsible parties, the right to the abolition of the privilege being *made free* to them, while at the same time they are not compelled to any step. An obligatory abolition would spoil their position. An *abolition* of the compulsory and interdictory rights *without compensation*, or by the taking over of the compensation obligations by the state, could scarcely be expected. Under these circumstances strenuous efforts must be made to utilise the not unfavourable attitude of the various districts to the privileged knackers in the sense of a development of the compulsorily privileged knackers' yards into institutions *free from all objection.*

After all, the knackers' yards with compulsory and interdictory privileges have very little to distinguish them from the district knackers' yard fitted up as a pattern establishment in Friedburg i/H., for here also a compulsory delivery of goods is the rule. Now, in order to fit up knackers' yards according to that pattern, it is necessary to make a compromise with the privileged knacker. A bargain will be the more readily struck with him if the future management of the more modernly appointed establishment be held out to him as an inducement. If in the contract made with him he be led to understand that he is still to retain his source of income under new conditions, he will not demand such a large indemnity as if he were expected to relinquish his business altogether.

In the district of Landsburg i/W. the following contract was made on 2nd December, 1892, with the compulsory knacker there: The knacker receives a sum of 1s. 6d. for every ox or horse, 6d. for every pig or goat identified in the district (November 1st, 1892), as compensation once for all. The indemnification sum came to about £200. The knacker had to bear a small proportion of the expense entailed.

The contract received the sanction of the District Committee, and in 1893 the knackers' privilege became extinct.

A report of the Hamburg Police Magistrates of October, 1897, "On the State of the Knackers' Business in Germany," which contains various valuable notices already given above, states as follows on the regulation of the knacker question, not a sentence of which but must be strongly approved of by every careful reader:

"1. In the interests of the public, a better organisation of knackers' business is urgently required, in order to counteract, as far as possible, any spreading of cattle epidemics, as well as to protect human life and health.

"2. If it were made a necessity to have perfect apparatus for the preparation of dead meat for the development and better organisation of knackers' business, this supposition would be fulfilled. The newer apparatus of this kind guarantee the certain destruction of the dead meat without any annoyance worth mentioning to the surrounding neighbourhood,

along with farther reaching economic utilisation of the material.

"3. For the attainment of this purpose efforts must be made to spread a network of knackers' yards, erected and managed by the various district committees, or by similar public bodies. Every animal that dies a natural death must be given up to the knackers' yard of the district, and the responsible body must pay a certain compensation to the owner of the dead animal. The necessary regulations can be issued by the local or district police board.

"4. For the promotion of such arrangements it is of great importance that the knackers' yards on the new system should be made to pay well as a whole. This depends on the scale of indemnification.

"5. In the interests of national economics as much should be done as possible to remove the existing prejudice against animal meat of *home origin*, and to set it in the place of, or at least on the same plane as, *foreign* goods of the same kind.

"If agriculturists were to use home instead of foreign feeding meal, they would thus be merely furthering their own industry, because the returns from the home product would more than make up for the sums paid out for compensation to the owners of dead meat."

CHAPTER XIII.

THE INSURANCE OF SLAUGHTERED ANIMALS.

(R. Strauch has written on this subject in a most masterly fashion in a book published in Bremen in 1895, "Insurance of Slaughtered Animals." In the following pages several references will be made to this work.)

General Remarks on the Insurance of Cattle for Slaughter.— In the last decade insurance has become a matter of great social and economic importance, having arisen at the beginning of the last century out of unimportant beginnings, and now having so thriven as could scarcely have been dreamt of at first, so that it not only includes all classes of the community in its members, but also has rendered secure the most varied interests of old age. All insurances have the common purpose of securing to the owner compensation for anything which is of value to him, and which could be wrested from him or injured by chance or accident, and thus *one* underwriter alone can undertake the risks of and compensations for damages, after he has received in advance a sum of money from the policy holders, or the risk can be borne by a number of persons who are bound in the same manner as the one party. But in both cases the insurance contract is a compensation for damages, and not a means of enrichment.

For a number of years insurance companies have existed, which offer to the owners the opportunity of guaranteeing them against the loss of their cattle by accident or disease, but there have been very few which offer compensation for cattle which, for any reason whatever, are unsuited for human consumption. Such companies have arisen quite lately, since meat inspection has assumed such importance and development, so that the insurance of every animal destined for slaughter has become to every farmer, cattle dealer, and butcher a question of moment.

As long as the State, which of late years has instituted so many valuable life insurances on other lines, did not move in this particular matter, those interested had to protect themselves as best they could against the risks of diseased cattle, especially wherever obligatory meat inspection was in force.

The *necessity* for cattle insurance is evident from the following points of view:

1. The prices of cattle in places where there is obligatory meat inspection and no insurance are higher than in other places, because few cattle are brought in, the dealers or producers not being able to protect themselves against loss, and thus preferring places where there is no meat inspection, or where a system of insurance is in force.
2. Where the price of cattle is high, of course the price of the most important article of diet—meat—is raised also, because it is only possible for the butchers to procure meat at a great sacrifice, and often only by giving up all claim for damages in the case of rejected meat.
3. The requirements in connection with compulsory slaughter are likely to be relaxed, and the tradespeople try to circumvent the regulations of meat inspection.

In proper appreciation of the great advantage of cattle insurance (particularly of cattle destined for slaughter), attempts have been made for several years in agricultural as well as in cattle-dealing and butchering circles, to institute *State* cattle insurance, but certainly with very little result.

The question of cattle insurance is already regulated in *Baden* and *Bavaria*. In the kingdom of Saxony a project, made public by the Agricultural Department of the Administration, concerning the introduction of obligatory meat inspection in connection with State cattle insurance (for oxen and pigs), has been approved of by the Saxon Parliament on the 1st and 2nd of June, 1898.

In some neighbouring countries the importance of such a State organisation has been recognised. In Austria, for instance, this question has been considered for some years back, and in Switzerland a law on obligatory cattle insurance is already in preparation by public consent. In France, a bill has already gone through one reading in the Chamber of Deputies, according to which the meat of tuberculous animals wholly withdrawn from consumption shall

be entirely and completely compensated for out of the State exchequer.

Compulsory Cattle Insurance in Baden.—In Baden, where obligatory meat inspection is regulated and subsequently carried out in a manner worthy of imitation, the State has, by the law of June 29th, 1890, concerning the insurance of oxen, etc., left it to the option of the different parishes to form local insurance companies, in which they are to be assisted by the State exchequer, and which are not to be dissolved within less than seven years. According to this law every head of cattle must be insured as soon as a corporation or parish resolves upon the formation of a local insurance office, which is then responsible for all damages. Should several localities unite in one company, then the local insurance board bears only one quarter of the losses, while the remaining threequarters is borne by the company. In this case an important regulation for our purposes becomes valid, namely, that then compensation is guaranteed for such meat as may be rejected by the police. On this Buchenberger remarks with truth: "The insurance of cattle destined for slaughter is a specially important element of the whole insurance business in its working—directly because it guarantees the covering of all losses, for which previously local bodies did not thoroughly hold themselves responsible, and indirectly because it will exercise an influence on the numerous disagreeable and costly lawsuits raised on account of the many police confiscations."

Since their foundation the Baden Compulsory Insurance Companies have steadily grown; for while on January 1, 1873, there were only sixty-five places in which there were such companies, in 1876 there were already 119 with 12,544 members and 44,407 head of cattle insured, valued at £598,960. The number of claims paid has relatively diminished since the first business year, as was to be expected.

In Bavaria the law concerning the erection of a public mutual insurance society came into force on the 11th May, 1896. Membership in this is *not* obligatory, and for this reason, and as well as because it is mutual, this organisation differs from that in Baden. A local cattle insurance company can embrace several parishes, or may only include one. The Local Board is empowered, and on the motion of ten cattle-owners obliged, to promote the formation of a local cattle insurance company. All local companies formed by

the acceptance of the statute and desiring to be received into the State insurance society form a land company. The society not only receives a starting capital of £25,000, but also an annual income from the State of £2,000. The management is effected under State control. After a few months the society numbered 800 local insurance companies.

According to recent experiments made in Baden and Bavaria, cattle insurance will only be completely successful if insurance is made *obligatory* upon every cattle-owner, and the insurance is extended to oxen, horses, pigs, and goats.

Communal Cattle Insurance.—Some communities in possession of public slaughterhouses have offered to butchers, etc., the opportunity of insuring their cattle against "rejection." In 1890 a local statute was issued by the town council of Leipzig, according to which all oxen and pigs brought into the municipal cattle-yard for sale must be insured by the salesman in the municipal insurance society for cattle destined for slaughter, if they were suitable for insurance in age, breed, and health. Animals brought into the cattle-yard and not intended for sale are exempt from this. This society had to record a deficit of £1,007 10s. in the year 1891. By increasing the premium it succeeded the following year not only in making up the deficit, but also in making a small surplus, which was carried forward into the next financial year.

In the year 1896 matters stood as follows:

Income	£22,940	1	4
Expenditure (including £250 for management)	22,754	8	1
Surplus of income...	186	13	3
Surplus from 1895...	1,152	14	9
Reserve fund	1,671	2	4
In all	£1,338	7	0

Some have vainly endeavoured to contest the rights of such an institution. The one victory on record, gained in a court in 1894, was rejected by the Appeal Court, the latter holding that the local statute concerning the formation of a cattle insurance society in the slaughterhouse at Leipzig is legal, because it is for the benefit of the community, and therefore of the town.

The insurance charges amount at present to 9s. 6d. for a cow; 7s. 6d. for an ox; 1s. for local and 1s. 6d. for foreign pigs.

An insurance society, formed on the model of that at Leipzig, has been opened in the Zwickau slaughterhouse by a local statute of May 12th, 1876. Compulsory insurance is, provisionally, only extended to cattle. The present premium amounts to 8s. for a cow and 6s. for an ox.

As far as is known, there is only one communal insurance society in Prussia. That is in the slaughterhouse at Kolberg, and has existed since the opening of the same in 1890. Only pigs *need* be insured; at first compensation was paid only in the event of rejections on account of trichinosis. There is a special insurance office for cattle, managed by the butchers' guild.

The statute of this communal insurance office runs as follows:

Par. 1. The pig insurance office is for the purpose of granting compensation to those whose pigs are slaughtered in the slaughterhouse at Kolberg, and are found unsuited for human food.

The office is managed in the same way as a municipal office.

Par. 2. The slaughter dues exacted for the slaughter of pigs are paid into this office, 3d. for each pig—paid quarterly.

Par. 3. Every owner of a pig, which after slaughter is found unsuitable for human food, receives from the office 6½d. for every pound of pork—the slaughterhouse commission fixes the compensation quarterly. The animal is weighed after being killed and cleaned. The intestines, lungs, heart, liver, and lights are not weighed and are not paid for.

Par. 4. Payment follows after an examination has been made and reported on by the slaughterhouse inspector or his representative and a weighing ticket has been presented to the slaughterhouse management.

The magistrates direct the financial affairs in other matters.

Par. 5. Every pig for which compensation is paid becomes the entire property of the municipality. The same holds good of the portions of the animal not weighed with it. If the meat of a diseased pig is esteemed merely "of little value," without being actually injurious for consumption, it is to be sold in the slaughterhouse raw or cooked, according to the quality of the meat or the judgment of the slaughterhouse inspector, and the proceeds are

added to the insurance office exchequer after the deduction of the costs.

Par. 6. The trichinosis inspector who has discovered the symptoms in the pig receives a special award of 15s. The payment of the same is made on notification thereof to the slaughterhouse management.

Par. 7. It is forbidden to take legal action regarding the payment of the compensation or the premium.

Par. 8. This statute becomes law on the day the slaughterhouse is opened.

It is very desirable that more interest should be shown in the matter of the insurance of animals destined for slaughter. There is no great risk to be incurred, for every corporation has power to wind up a cattle insurance company which does not pay after the lapse of a definite period, and to make good any losses incurred therein in the interests of the public, whose institution it is, by reason of par. 11 of the Corporations Law.

A resolution having in view the formation of communal insurance societies was passed at the Conference of Slaughterhouse Directors, Landowners, etc., held in May, 1896, on the motion of a Mr. Goltz, of Halle, which runs thus: "Should the introduction of a general insurance be abandoned, this Conference considers it advisable that the legal right be granted to communities which have introduced obligatory meat-inspection to institute some kind of insurance of the animals destined for slaughter in the district where communal meat inspection is valid."

Industrial Cattle Insurance. – But there are quite a number of industrial insurance societies with agents in different towns which, in addition to effecting general insurance, offer security against losses sustained by the rejection of animals for slaughter, such for instance as the Central Cattle Insurance Company of Berlin (since 1887); the Hanseatic Cattle Insurance Corporation in Hamburg, the National Cattle Insurance Company in Cassel (both these companies only insure against trichinosis), the Rhenish Cattle Insurance Company in Cologne (of late this company has not undertaken the insurance of *single* animals, as it did not pay to do so), and many others.

These companies would be more popular were the premiums not so high, and if the procedure for ascertaining the damages were

not so cumbersome and attended with so many intricacies. As regards the premium, we give below those charged by the Berlin Central Cattle Insurance Company. These amount to—8s. for large beasts worth £15; and for every £2 10s. in value over that, 6d. extra.

For young bullocks (two years old) to the value of £7 10s. the dues are 4s. each; calves, 1s.; sheep, 7½d.; pigs worth £6 pay dues amounting to 1s.; if valued up to £7 10s. they pay 1s. 5d.; for every £2 10s. worth additional an extra due of 5d. is charged. To this add postage, etc., and fees which the veterinary surgeon claims for looking after and examining the animals; and which for bullocks are estimated at the lowest at 1s., pigs 4d. to 5d., and small animals from 1d. to 2d.

The rates of premium are similar with the Perleberger Cattle Insurance Co., founded only a few years ago, and to private people they amount to—for young cattle three per cent., but not under 8s. or over 12s. per head; for pigs and calves, 1s. per head. From trading butchers and landlords when they kill more than ten head of one kind in a year the dues are according to agreement—for bullocks, from 5s. to 10s.; for young cattle, 3s. to 6s.; for calves and pigs, 5d. to 1s. per head. All rejected pieces and portions of smaller value are reimbursed. This association has made great headway in a large number of slaughterhouses. The premium for calves and pigs is higher with the Cattle Insurance Society of Schwerin. They charge for these animals 2s. per head.

The *limited companies* are cheaper, as, for instance, the Magdeburg Insurance Company for Animals Destined for Slaughter, and the establishment of the same kind in Breslau. These companies have no agents, nor have they a large staff of officials to keep up.

But the cheapest of all are undoubtedly the mutual insurance companies which have been established in various districts by the members themselves, and consist of agriculturists, cattle-dealers, and butchers. Such private insurance companies have been founded since the practice of meat inspection has grown so much in extent and importance. In most towns with slaughterhouses or obligatory meat inspection, such insurance companies have arisen, which either spring from some previously existing insurance office against trichinosis, or from a butchers' guild, or by the common union

of agriculturist, butcher, and cattle-dealer. These all, without exception, have nothing to show but the best results. These co-operative societies, of course, can be worked much cheaper than companies which follow the insurance business as a profession, as the cost of management is very small, for with the exception of the inspecting veterinary surgeon and the cashier, all the officials are honorary, while in other societies a numerous army of agents and other officials is maintained at the cost of the policy-holders. In any case this species of common protection is the most favourable imaginable, because thereby as great a number of possible interests are united, and accordingly the premium can be all the lower, which has an important influence on intending policy-holders.

An insurance office can only be of use and have a lengthy existence if it be stipulated that :

1. The animals to be insured must be inspected by a veterinary surgeon before slaughter, and only those accepted which are living, uninjured, and without trace of disease, and have not lost flesh in any way, so as to prevent the market price being obtained for them.
2. All meat which is exposed for inspection *after* slaughter, for the first time, must be excluded from insurance.
3. There must be a Freibank or a similar institution for the utilisation of meat that is not suited for the ordinary market.
4. Arrangements must be made for the best use possible of the dead meat totally unfit for human consumption, whereby a considerable income will accrue to the insurance office.

It is also desirable, in the interests of the public who do not slaughter for industrial purposes, that stipulations should be made in the statute, which empower *everyone* to be able to insure his animals destined for slaughter, even though a higher premium be charged.

On summarising the above, we find that, in a town with compulsory meat inspection and a public slaughterhouse, such an insurance is of vital importance to the agriculturist and the butcher, and that there are, in the main, two sorts of insurances which answer every requirement. These are :

(*a*) One in the hands of the municipality, which makes it possible for everyone who slaughters on the municipal slaughterhouse to insure his own cattle.

(*b*) A mutual insurance company, consisting of agriculturists and butchers.

According to legal regulations, an insurance company can either be—(1) a mutual society, or (2) a company or association.

(1.) Although a premium is given for insurance, the mutual society is not a trading concern, for such a society is not instituted in the sense of the Land Laws for the purpose of making money. It is not formed so that the individual members thereof may make a profit; the liability for the possible losses of income entails also the accepting of the possible gains, but this receipt does not mean an enjoyment of these gains by the individual parties. Becoming a member of the society entitles one to the right of demanding compensation in the case of loss to himself, but at the same time one is under the obligation of undertaking the risks of other members. The policy-holder does not individually gain if no compensation is paid; he also does not suffer any loss; the liabilities and possible losses are borne in common by all the members.

(2.) The company. By a company is understood a society open to any number of members for the purpose of promoting an industry belonging to its members for their common good. They acquire the rights of a private company according to the law of May 1st, 1889.

The promotion of the industry and economy of their members must be the motive for the establishment of a company and the conducting of its business, and therefore it is hoped that insurance companies may be excluded from the rights of private companies. But in Germany companies may be formed in order to make profits by means of a common business, and the section added to the new law (quoted in Chapter II.) does not offer any doubt as to the legal possibility of being able to form companies for insurance purposes.

The companies can be formed either

(1) In such a manner that every member is directly liable for the engagements of the company, and indirectly to the creditors of the same, to the amount of his whole property (private company with unlimited liability).

(2) In such a manner that the members are liable to pay up their whole property to the company, but not directly to

their creditors, being only obliged to make subsequent payments for the satisfaction of the creditor (private companies with unlimited obligations as regards subsequent payments).

(3) In such a manner that the liability of the members for the engagements of the company and also to its creditors is limited to a certain sum (private company with limited liabilities).

But in general, cattle insurance is conducted on the lines of mutual insurance rather than on those of any of the above companies, because the organisation of the latter is simpler and the conducting of its business is less complicated.

Below we give an example of a memorandum for an insurance society conducted on mutual principles and recommended in the establishment of a company—the memorandum of the Cattle Insurance Company at Cassel (private company with unlimited liabilities)—and of the slaughterhouse insurance of the Agricultural Labourers' Company of the Saal Wiener at Halle (company with limited liabilities[1].

ARTICLES OF ASSOCIATION OF A SLAUGHTERHOUSE MUTUAL INSURANCE SOCIETY.[1]

Par. 1. The association shall bear the name of the "Insurance Society for Cattle destined for Slaughter in ...." in the jurisdiction of the town of.....

Par. 2. *Object of the Association.*—The object of the association is the mutual insurance of its members against those losses which result when animals taken into the municipal slaughterhouse for the purpose of slaughter are rejected by the police.

Par. 3. *Details of Insurance.*—This insurance includes cattle (bulls, oxen, cows, and calves) and pigs, which have been brought into the aforesaid municipal slaughterhouse alive and uninjured. Oxen under a year old are not insured.[2]

1. Animals which, after being driven into the slaughterhouse, are pronounced diseased on examination by the veterinary expert, or whose slaughter is ordered in accordance with the police orders of the epidemic laws of June 23rd, 1880, and May 1st, 1894.

[1] This statute contains many regulations, taken from the model articles prepared by Strauch.

[2] Strauch recommends that the age fixed be six months, "as the age of the younger oxen can be better fixed if a less strict control is practised." He recommends also that sheep and calves should be insured, as rejections are not frequent with such species of animals, while the great number, even though a low premium be fixed, contributes materially to the increase of the income.

2. Cattle which on account of suspected disease are placed under veterinary supervision for the time being.

3. Cattle which are so lean that their flesh will not contain sufficient nourishment to command a market price.

4. Old boars for breeding purposes are excluded from the privileges of insurance.[1]

The board is entitled to have insured cattle, etc., inspected *before* slaughter for the purpose of finding out if they are fit subjects for insurance. The owner of insured animals is obliged to assist the veterinary surgeon for the necessary time for such an examination. The orders of the board on this point must be followed.

Par. 4. *Membership.*—Every cattle owner, butcher, meat salesman, or cattle dealer who slaughters cattle, etc., in the municipal slaughterhouse, or has cattle slaughtered, or sells animals for slaughter, is entitled to become a member of the association.

If the person who intends slaughtering the animal to be insured is not himself a member of the association, but only the salesman,[2] he must secure from the latter a warrant stating that the animal has been sold to him for the purposes of slaughter, and that the insurance dues have been paid. This warrant he must present at the insurance office. In every case the insurance must take place as soon as the salesman or purchaser becomes a member of the association.

Part insurances are not permitted.

Those persons who only possess, in all, three head of cattle or fewer are allowed to make single insurances without becoming members if they pay a double premium.

Everyone who slaughters animals for *industrial* purposes *must* become a member.

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[1] If sheep are to be insured, breeding goats must be excluded.

[2] Strauch quotes the following stipulations as unique: "Every cattle salesman who, as a member of the association, sells cattle in the Neisser slaughterhouse for the purpose of slaughter, and also butchers who are members of the association, are obliged to insure cattle bought from members before slaughter. Cattle breeders who, as members, undertake slaughter themselves in the slaughterhouse or have it done for them, must pay the full premium. Animals destined for slaughter which are sold by a non-member to a member and eventually reach the slaughterhouse to be slaughtered cannot be insured; nor are such animals insured as are sold by a cattle-breeding member to a salesman who is not a member.

"Part insurances are not allowable.

"Only such animals may be insured as are in the possession of the members of the association, or at least partly belong to them. In the latter case the member who has part ownership must pay for the insurance of the whole animal.

"A butcher who is a member of the association must pay insurance for an animal which he buys from a member for the purpose of re-selling to a member or non-member. In this case the animal in question does not require to be insured by the buyer, who has it slaughtered for him."

Animals for slaughter in the *joint* possession of certain persons who have been debarred from the membership of the society owing to badly injuring their animals cannot be insured.

Par. 5. *Admission to Membership.*—Admission to membership is by making a verbal or written application to the board, which then draws up a card of admission.

By this announcement, and the payment of an entrance fee of 3s., the applicant binds himself to agree to the conditions stipulated in this statute, and takes upon himself the rights and duties of a member.

Par. 6. *Expiration of Membership.*—Membership expires:

1. In consequence of a written notice sent in to the board by the member at the end of any quarter of the calendar year, the notice being given a quarter in advance.

2. In consequence of the member being excluded by order of the board in accordance with par. 9. In the latter case the member thus excluded remains liable for his premium up till the end of the financial year in which he was ejected from membership.

Par. 7. *Premiums.*—A premium must be paid by all members of the association for every head of cattle liable for insurance brought into the slaughterhouse by him, or sold for this purpose. The premium must be paid by the butcher into the office of the society immediately after inspection by an expert. The dues are:

For a bull or ox	3s.[1]
For a cow	4s.
For a pig	9d.

Par. 8. Notice of insurance must be given to the board or at an office erected for the purpose by the board. When giving in the notice, the member is obliged to state the price he paid for the animal and all the circumstances regarding it which refer in any way to its eligibility for insurance. If these obligations are not fulfilled, the board is not bound to adhere to the conditions of insurance for the animal in question. Besides, the member contravening these

[1] It is advisable that a higher premium be charged for a cow than for a bull or ox (perhaps 1s. 3d. more, or 5s. altogether), as the former is much more likely to be rejected than the latter, The above figures are well averaged.

Various insurance associations levy the premium according to the value of the animals, and accordingly make six classes.

Sheep can be charged at a premium of 1½d., calves under 2 cwt. 3d., heavy calves over 2 cwt. being charged a double premium.

regulations is liable to be fined by the board to the extent of 30s. (Strauch recommends a higher fine and a latitude of from 10s. to £5.)

Par. 9. If the insurance premiums fixed in par. 7 are not sufficient to cover the expenses of the board for the current year, they are entitled at the end of the financial year to levy an additional premium on all members, in proportion to the sums paid by them throughout the year, for the purpose of covering these expenses.

The entire sum demanded from each member must not be more than double the amount paid by him in premiums in the course of the year. No expenses over this amount can ever be exacted from the members.

These additional premiums must be paid into the office of the association within eight days after the notice of the same is published in the local newspapers, or, in the event of the non-existence of such, in another newspaper agreed upon by the board of the association.

Should a member fail to make the payment of the additional premium within a further period of eight days, and is aware of the notice, he loses all right of membership and indemnification claims at the expiration of this period. But he is still a member in the sense of having to pay his obligations, to which he can be held. When these are paid he is turned out of the society.

Par. 10. *Compensation Claims.*—The members of the association may claim compensation :

(*a*) If the flesh of the cattle brought in and killed in the slaughter-house, or parts thereof, be found unsuited for human use, or of inferior quality, by the expert appointed for the purpose of examining them in accordance with existing regulations.

(*b*) If the animal dies in the slaughterhouse before slaughter, through no fault of the owner or his employees.

(*c*) If the lungs and liver together are completely rejected, and this rejection is not made because of faulty or irregular treatment of the animal during slaughter.

If so compensated, the owner must give up all further claims. The butcher is obliged to take over all the unrejected and thoroughly sound portions of the animal slaughtered.

The compensation sums for the rejected *organs* are fixed by the board and published at the beginning of every quarter.

The compensation granted amounts to the full sum of the sale price paid, inclusive of slaughter dues. This sale price is attested by a certificate from the salesman or the former owner, and signed by the magistrates, or some such guarantee is attached. If several oxen have been bought at once and a lump sum has been paid, an average sum is taken. If the sale price of the animal by which loss is sustained cannot be ascertained, or if it be suspected that it is fixed at too high a sum, or if it concerns the ascertaining of the value of an animal raised by a member of the association, the compensation sum is settled conclusively by means of the Court of Arbitration (par. 24), legal actions being forbidden.

Single pieces of meat which are unsuited for human consumption, or are of inferior value, are to be compensated for in proportion to the sale price of the animal or its value.

Par. 11. No compensation will be granted :

1. For isolated pieces of rejected meat or fat under 12 lbs. in weight.
2. For rejected or diseased portions of the interiors of animals with the exception of the lungs and liver.
3. If the meat of the animal is rejected, or pronounced of little value, because of broken bones, sores, bruises, etc., from which the animal has suffered while still alive.
4. If the person claiming compensation has made false representations to the association, or has abused his obligations by not making known all the circumstances regarding the case, the animal is not eligible for insurance.
5. If the person claiming compensation has knowingly sold an animal afflicted with one of the epidemics mentioned in the epidemic law of June 23rd, 1880.
6. If the person claiming compensation, or his representative, does not follow or overstep the police regulations for protection against epidemics (laws, June 23rd, 1888, and May 1st, 1894).
7. If the member has insured his animal in any other insurance society.

Par. 12. If one member has to be paid compensation repeatedly —say at least three times in the same quarter—the compensation

to be paid by the office for the rest of the year can, by consent of the board, be reduced fifty per cent.

The board is entitled to exclude from the association those members in whose cattle stalls there have been repeated cases of disease, resulting in rejection, and caused by special feeding or breeding, if notice be not given that the causes for these diseases, etc., are removed.[1]

For such animals as compensation is granted for, out of the public purse, by reason of the Epidemics Law, the association only pays compensation for that portion of the sale price or the ascertained price not already made good otherwise.

Par. 13. If the extra premiums demanded according to par. 9 do not suffice to cover the compensation claims paid out, the member must be satisfied with the amount offered him, but endeavours will be made during the next two years to pay up full compensation with any balance that may remain then after paying current expenses and compensations.

Par. 14. *Notification and Settlement of Claims.*—Compensation claims must be notified to the board of the association, or at some notification office erected by them, either verbally or in writing, within twelve hours after the member becomes acquainted with his loss. The period begins at the end of the hour in which the slaughterhouse veterinary expert has declared the meat as "rejected," without respect to the hours of the night. The notification of the claim must contain the reason for the rejection of the animal, its species, its sale price or value, and the name of the salesman.

Immediately on receiving the notification of claims the board arranges for the amount of the compensation. They must declare as quickly as possible—certainly within three days—how much they will pay as compensation. If the board refuses payment of the claim entirely, or of the whole sum specified, the member must inform the Court of Arbitration of the matter within eight days, counting from the day that the letter was written to him explaining the refusal.

[1]Such a regulation is very necessary, as many farm-yards—particularly those of landowners—breed tuberculous cattle, in consequence of feeding the latter with sloppy food, unboiled milk, etc.

The compensation must be paid to the policy-holder within a month at the latest after the board of the association has received notice thereof, or after the consequent decision of the Court of Arbitration. In the first business year the above-mentioned period of payment need not be extended.

Par. 15. The rejected animals, or portions thereof, become the property of the association, the board of which may utilise the same for the benefit of the association, in any way allowed by the police. By payment of the damages the association obtains the rights of the members against a third party.

The member is especially bound to surrender all his claims in favour of the board, in the case of his having bought an animal from a salesman *under guarantee* or is justified by the law in making guarantee claims on the salesman. The member is bound to acquaint the board of the association, or the agent appointed by them to conduct the lawsuit, with all the information possible regarding the transaction.[1]

Par. 16. The association is subject to the control of the State. Changes in the wording of this memorandum are only valid after the express approval of the Government authorities.

The Police Board undertakes the direct control of the association, and it is especially authorised to appoint a committee which can call meetings of the association, inspect the association's books and papers, and demand abstracts of the accounts.

Par. 17. *The Board of the Association.*—The association is exclusively conducted in all its affairs by a board consisting of five[2] members, all these officials, with the exception of the president, being chosen from amongst the members. This board is invested by law with a special power by which they can represent the entire

[1]The introduction of such marks as brand the animal during its lifetime is a suggestion not to be underrated by insurance associations. If the brand is once made in the ear of the animal and each stamped with a successive number, it cannot be removed without destroying the ear. A second use of these marks should not be allowed. The best of these are the Crotalia marks.

By an Imperial order of Aug. 25th, 1896, the use of these marks is made obligatory in Belgium for all cattle, as by the order of Oct. 30th, 1895, tuberculosis is included in the law relating to epidemics, and losses by this disease are compensated for by the State.

[2]It is not advisable that the board should consist of more than five members, and the number should never consist of more than seven, including a cashier and a veterinary surgeon.

It is not always the case that the veterinary expert and the cashier are members of the board. It is the custom for the veterinary expert to receive a remuneration of £22 10s. to £30 for the examination of cattle to be insured. In small establishments he also undertakes the duties of cashier. When there is a cashier he receives from £12 10s. to £15.

A ministerial decree of Jan. 3rd, 1898, forbids the agents of cattle insurance associations being employed in meat inspection, or holding positions as veterinary experts. The examination of animals destined for slaughter is permitted by the ministerial decree of July 5th, 1898.

association before private parties, magistrates, etc. All members of the board, with the exception of the slaughterhouse manager and cashier, must be members of the association. Documents which bind the association to rights of property must be signed by the chairman of the board or his representative.

The board is entitled to carry on lawsuits, to subject the decision of a legal contest to a court of arbitration, to make amicable arrangements, to explain cessations and abandonments of claims, to receive goods or money, and give receipts for these, to sell or buy property, and to grant or propose entries or discharges in the Land Register Books.

The money of the society is to be lodged in the municipal savings bank. The cashier has, by order of the board, to draw up and sign receipts for entrance fees and premiums.

The business year begins on the 1st of January. An attestation from the police authorities serves the purpose of legalising the board in its proceedings with outsiders. This must be read before every meeting called for the purpose of choosing new members for the board.

Par. 18.—The chairman or his representative takes the lead in all the affairs of the board, and also at the general meeting. He calls a meeting of the board as often as the business of the association requires, especially when a meeting has been proposed and agreed upon by three members of the board. The minute book is kept by a clerk chosen from among the members and signed by the chairman and one member. The presence of four members constitutes a quorum. Resolutions are decided on by a majority of votes. In the case of an equal number of votes, the chairman has a casting vote.

Par. 19. *General Meeting.*—The general meeting is attended by all the members, each individual present having a vote. The special business of this meeting is—

(*a*) The choice of the members of the board and the Court of Arbitration.

(*b*) The apportionment of the various portions of business.

(*c*) The passing of the balance-sheet prepared by the cashier for the year that has just expired.

(*d*) The reading of the annual report prepared by the board, two copies of which are to be handed over to the police authorities along with the annual balance-sheet.

(*e*) Every alteration in the resolutions.

(*f*) The dissolution of the association.

Par. 20. The board decides the date of the general meeting and issues invitations to the members of the association through the chairman. A general meeting is called, as often as the board deems it necessary for the proper conducting of the business, and also within a period of not longer than four weeks after a tenth part of the members of the association have made a reasonable demand that such should be held.

The invitation to the meeting is given by being inserted at least twice in the local newspaper not less than eight days before the meeting is to take place.

Par. 21. The resolutions of the general meeting are not legal unless at least a tenth part of the members of the association be present.

Should a general meeting be adjourned on account of the insufficient number of members present, the resolutions passed at the next general meeting will be held legally valid, whatever the number of members present, if special attention has been drawn to this point in the invitation in the newspapers.

The resolutions of the general meeting are passed on a majority of votes. Where there is an equal number of votes, the chairman decides.

Par. 22. *Choice of the Board.*—The board is elected for a term of three years. Retiring members are again eligible.

The election of each member of the board is decided by a majority of votes. The same holds good of the choice of the chairman.

Par. 23. Should a member of the board resign within the three years' term of his office, his place must be filled by a member for the time being, chosen in accordance with the rules in par. 22.

Should the necessity for such a choice arise at a time when it is not expedient to call a general meeting, the board is authorised to carry on its business minus a member, until there should be occasion on other grounds to call a general meeting.

Par. 24. *The Court of Arbitration.*—A court of arbitration is formed for settling all the differences between the association and

its members, and can deal with all questions arising in connection with the admission to and the expiry of membership, the compensation and indemnification claims of members, and the obligations and rights of the various parties; and all legal actions are forbidden. The rules as to the mode of selection of members for this court are the same as those in par. 22.

The court of arbitration consists of five members, chosen at the general meeting from amongst the members of the association for a period of one year. The members of the court of arbitration choose their chairman from amongst themselves. The court of arbitration can pass resolutions on the agreement of three of the members.

Par. 25. *Reserve Funds.*—After the expiry of the first financial year a general meeting is held, which resolves on the sum to be placed to the reserve fund.

Par. 26. The operations of the association are limited to the boundaries of . . . . . and only persons residing therein can become members.

Par. 27. The dissolution of the association can be carried at a general meeting, and the remaining funds of the association are to be used for the purpose of fulfilling the obligations of the association which may be still unsettled.

Here follow the signatures of the board and also, in accordance with par. 1 of the Prussian law concerning the business affairs of insurance societies (May 17th, 1853), the government board's chairman's seal of approval.

Forms for membership cards, insurance warrants, and information as to how to keep the books will be found in the books on the subject by Strauch.

CHAPTER XIV.

THE CATTLE MARKET.

In different towns we find cattle markets in connection with public slaughterhouses. This custom prevails in Mid and South Germany, while in the northern parts of the Empire the conditions are different. Until quite lately there was no town in the provinces of East and West Prussia, Pomerania, and Posen, in which there was held regularly every week a cattle market for the supply of neighbouring towns, worth mentioning, although many cattle were sent into other provinces. The sales took place directly between producer and salesman, the latter loading his cattle at any railway station, for the larger towns in other provinces. Of course veterinary inspection was as much out of the question as are thorough disinfection and supervision at all small loading stations now. As such conditions are still prevalent in all parts of Germany, in spite of the increase of public slaughterhouses, it is not a matter to be wondered at that epidemics prevail from time to time, causing the closing of the slaughterhouses, and occasioning considerable disturbances, as well as losses to the most varied interests. Of what avail is it that a few large cattle markets are provided with all imaginable arrangements for preventing the spreading abroad of epidemics, or that numerous veterinary experts subject every single animal to an examination of scrupulous exactitude, when there are in the provinces countless loading stations and collecting places for animals destined for slaughter that are in no way supervised by the veterinary police, and are arranged so faultily that, if ever disinfection is attempted, it is totally inadequate, from the lack of suitable appliances, and it is therefore quite natural that if an epidemic gets a footing in one of these places it is communicated to every fresh animal passing through, and is carried into the public slaughterhouses. This evil should be seized by the root. *Cattle depôts* under *scrupulous* control, and arranged in every way by experts,

should be provided in every district, in as great a number as required. In these there should be a thorough inspection of each animal driven in, also rational disinfection, etc., etc. It is clear that this would not altogether prevent every outbreak of epidemic, but at any rate the number of the latter would be reduced to a minimum.

Certainly of late such depôts have been erected in different parts of the country where there was formerly no cattle market, and at a considerable cost. In Danzig, Königsberg, Kiel, and Stettin there are such, and in Posen one has been opened quite lately; in Stolp a feeble effort has been made to hold small weekly markets as well as the great annual fair on the new, and as yet rather primitive, market place beside the slaughterhouse, certainly so far without much success.

The most numerous, in proportion to the dense population and the preponderance of industrial pursuits, are the cattle markets in the Rhine provinces, of which there are ten, while in the other Prussian provinces there are only twenty or thirty altogether. In Bavaria there are sixteen, in Saxony six, in Würtemberg three, in Baden four, in the other German confederate states twelve—that is seventy-one in all Germany. These numbers must not be taken as decisive, as the term "cattle-yard" is elastic, and is variously used.

Almost everywhere the cattle market is in the possession of the town; wherever in isolated cases it is in the hands of private parties or associations, the town authorities of the place have endeavoured to monopolise the cattle traffic with more or less success, and in most of the cases favourable results have been attained. On the other hand, there is no lack of towns where considerable sums have been sunk in magnificently appointed cattle markets, in which such a poor traffic has been developed that the rooms have either been let out for other purposes (Bernberg) or additions of funds have to be made for the up-keep of the establishment out of the town exchequer (in Halle about £1,270 annually, Magdeburg about £1,500, Königsberg and Barmen about £2,000). Therefore it is advisable to let cattle-yards develop themselves out *of small beginnings*, at first being only the real necessities, adding larger buildings by degrees as soon as the productiveness is fixed without any doubt. For the necessary expenses in the conducting of a cattle-yard cannot be so well regulated as those of a slaughter-

house on the ground of legal stipulations, but the first arrangements should be made to meet the income expected.

GENERAL DESCRIPTION OF THE ESTABLISHMENT.

Advice as to the situation of cattle markets is contained in page 77 in the report of the Royal Saxon Commission on Veterinary Matters, July 10th, 1891, and also in the report of the Royal Prussian Technical Committee on Veterinary Matters, February 19th, 1894.

In the latter we read: "Experience proves that the connection of cattle markets for cattle, sheep, and swine with slaughterhouses considerably promotes the spreading of contagious diseases. During the last few years numerous outbreaks of foot-and-mouth disease in the various provinces of the Prussian and other German states could be traced to the fact that in Berlin and in other great cattle dealing centres the diseased animals in the slaughterhouses had been infected by cattle and swine brought in from the market. Besides foot-and-mouth disease, lung disease in cattle, red murrain in swine, and swine fever, have been spread from the markets to the slaughterhouses, and so carried further over the country. Small-pox amongst sheep is of no material interest for the situation of slaughterhouses, because this outbreak has been stopped in Germany for a long time, by taking legal precautions."

Animals for slaughter only remain one or two days in the stalls and pens erected in the slaughterhouse. Now, an order has been issued that animals destined for slaughter, and brought into the slaughterhouse for that purpose, should not be brought back to the cattle-yard. But if both establishments are not separated from each other, this order can easily be disobeyed. It is still less easy to prevent the butchers going from the slaughterhouse to the cattle market and *vice versâ* when the two are in connection with each other. Now, if an epidemic rages amongst the animals in the slaughterhouse, the butchers, in their examination of the animals, can carry away some infectious germs on their clothes into the cattle market and unconsciously distribute these throughout the stables, pens, and halls, and thus infect some of the healthy animals there. In this way foot-and-mouth disease has very often been carried into the cattle market from the adjoining slaughterhouse, and from thence into remote neighbourhoods.

The contagion is retained in the dung from animals suffering from an epidemic even after it has been thoroughly disinfected; if it is carried away from the slaughterhouse or cattle market, the contagion may be spread to the cattle in the neighbouring localities.

If the spreading of the disease from the slaughterhouses to the cattle market is to be absolutely prevented, *both establishments must be separated from each other, and in such a manner that neither animals, fodder, manure, nor any other object or objects suspected to be infected can be taken from the slaughterhouse to the cattle market.* Access to the cattle market must only be permitted to the butchers and the other persons who come in contact with the animals in the slaughterhouse, if they can prove that their clothes and boots have been thoroughly cleaned previous to their entry.

It is a very necessary regulation that animals brought into the slaughterhouse can *not be driven out again* without the approval of the police. This approval is only to be granted when the animals are to be conveyed by rail to another public slaughterhouse under veterinary police supervision. In cases where the cattle market and slaughterhouse are side by side the latter must be connected with the railway by a special line, so that animals destined for slaughter may be brought to the slaughterhouse without coming in contact with the cattle market.

The bringing in of animals infected with disease, or suspected o being so, renders necessary the preparation of special stages for unloading, and a large building for the temporary stabling of the diseased or suspected animals. For the rest there must be a plentiful supply of stalls and pens for accommodating all articles brought in.

It is imperative in veterinary police interests that the stalls and pens should be provided with arrangements for the speedy carrying off of the urine, etc., and that the flooring, and also the footways in between, should be laid with impermeable paving material.

A careful veterinary examination of all animals brought into the slaughterhouse is necessary both on their arrival and their departure. For this purpose it is best to erect long broad platforms, on which the examination of the animals can take place immediately after being unloaded from the railway trucks or directly before loading them. For small animals—sheep, pigs, etc., it is advisable to prepare two platforms with impervious flooring, one behind the

other, one of which serves for loading and unloading the animals conveyed in the upper storeys of the cattle truck. If the animals destined for slaughter require to be driven or led from the cattle market to the slaughterhouse, they must be conveyed along a special road for the purpose, which must not cross the roads from the cattle market over which the exported cattle have to pass.

It is also advisable that the loading stations in the cattle market for sheep and cattle be separated.

A large observation stall should be fitted up at a suitable part of the cattle-yard, in the neighbourhood of the slaughterhouse if possible, in which those animals suffering from disease or suspected thereof can be put, so that they are not brought direct into the slaughterhouse.

The manure must be removed daily from all parts of the cattle market and taken to the manure-heap. The latter must lie quite away from the roads and places over which cattle are driven.

In this verdict strong opinions are expressed against the direct connection of cattle market and slaughterhouse, whereby the transmission of contagious diseases from the slaughterhouse to the cattle market is very much more likely. In some towns therefore the two establishments have been strictly separated from each other, as for instance in Munich and Hamburg by a street, in Berlin by a railway line, and in Paris (La Villette) by a canal (l'Ourq Canal). By this arrangement it is possible in the case of an outbreak of disease to ensure the certain and complete isolation of the two establishments.

A cattle market should contain about 2,000 square feet for every 1,000 inhabitants (Osthoff reckons 3,000 square feet to every 1,000 inhabitants).

The buildings are laid out in accordance with local requirements and with the special purposes for which the cattle market is and can be in the form of :

1. *Open Stalls*, which are the cheapest and simplest, but in northern localities the most unsuitable.
2. *Covered Markets*, which are just as suitable for northern localities, but should also include some separate pens.
3. *Market Pens*, which are decidedly the most advantageous for

northern localities, as they not only give the necessary protection for the animals, but at the same time give buyers the opportunity of going round and looking at them.

4. *Combination of Hall and Pens.*
5. Finally, as in Frankfurt a/M., open stands for large cattle can be erected alongside of the market, or, as in Amsterdam, open stands for large cattle and pens roofed with corrugated iron for small cattle, and also stalls for all kinds of animals.

Special Description.—The cattle market, like the slaughter-yard, should be walled round unless it is only to be used as a common market-place, and if the two establishments are side by side, to shut it off from the slaughterhouse. The most primitive arrangements on such places are *open stands* (some of these being fitted up in the slaughterhouse-yard *in front of* the halls), with perpendicular and horizontal rows of barriers, or with pens. These have an advantage over the open market-places, as they can be better controlled and offer a better security, although neither the public nor the animals are granted any protection from wind and weather. The barriers of wood, or, better still, of iron, are so arranged that they can be removed if necessary by taking away the cast-iron ends, which stand in sockets let into the ground, and covering up the openings for the latter with plugs: an arrangement which is also very practicable for the halls (Bremen). It is very difficult to keep such places clean if, on grounds of economy they have not been paved, and only been strewn with gravel or macadamised, paving alone offering the possibility of thorough cleanliness and disinfection. The most suitable, but the dearest, is grooved paving. The principal objection to pavements—that animals tired out by transport can rest better on a soft flooring – is not an unreasonable one.

A standing place 3ft. wide and 8ft. long should be allowed in such open cattle markets for every head of large cattle (horses or oxen). There should be a passage 4ft. 9in. to 6ft. 6in. wide in front of the heads of the animals, and one 10ft. wide at the tails. The head passage is often dispensed with for economic reasons, so that *one* barrier suffices for *both* sides. If the rest of the place with the exception of the stands is unpaved, there must at least be a paved road for driving in the horses. There must be paved pens for small beasts, particularly for swine. Permanent pens can be replaced by movable hurdles.

Then for small breeding animals, sucking pigs, calves, etc., there should be another part of the cattle market reserved, as is done in Wiesbaden, where a *special* place is assigned to these animals, to avoid any infection, if possible.

Then there must be a place for putting up the *waggons* of country customers.

All further arrangements—halls, stalls, etc.—give to the cattle market its distinctive character, and are attended with considerable claims to importance in veterinary police views; above everything a faultless impermeable paving of the whole establishment.

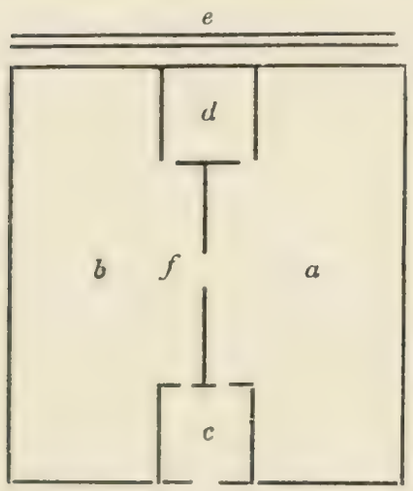


Fig. 156.

a Slaughter-house. d Sanitary establishment.
b Cattle yard. e Railway line.
c Frontage. f Control.

A continual control of the doors of communication between the slaughter-house and cattle market is absolutely indispensable. The checking office or porter's house to be erected here can also be used as a disinfecting room for clothes and foot gear in the case of the outbreak of disease. In Cologne, cabins have been constructed in the yards for diseased animals (shown at *d* in the accompanying plan, fig. 156), in which those persons who enter this portion and come in contact with diseased cattle are subjected to a thorough disinfecting with chlorine gas. The buildings for the management and the exchange are often situated on the boundaries of the establishments; but it is preferable that these buildings, as well as the official dwelling-houses, should be erected in the foreground separated from the cattle-yard and slaughterhouse. The sanitary building should be situated on the boundary of the two establishments, for reasons given further on.

The *exchange*, which has already been referred to earlier in the book, contains offices, dwelling rooms for the caretaker, bedrooms for dealers coming from a distance, and in the larger institutions some rooms for police, post officials, and cattle salesmen. For the convenience of the latter small portable offices have been provided in the Hamburg cattle-market.

The number of buildings, halls, pens, etc., depends on the size of the business. In the very small markets the animals are brought

into *one* large hall separated only by horizontal walls, or pens are erected on the boundary of the cattle and slaughter-yards as in Landau and Gera (see figs. 53, 55 and 56).

Osthoff holds that in a well-regulated cattle-yard the halls should be so situated that their frontages face the frontage of the slaughter-house-halls, as in Breslau, Chemnitz, Dusseldorf, and Halle.

The Market Halls.—There are halls for all sorts of animals destined for slaughter and other purposes. The simplest kinds have protecting roofs resting on wood or iron pillars, but if the spaces between are open on all sides, the draughts are almost insupportable. The place should be closed up and the necessary light supplied through windows, as in the cattle-yard in Berlin (1889). Of late those with massive walls and many windows or sky-lights have been preferred to the slightly built markets that are often so cold in winter. If the roofs are allowed to overhang about ten feet or so, then, in cases of necessity, some animals can find shelter underneath.

As a general rule, all these halls have ordinary roofs with painted rafters, and sometimes they are formed of concrete arches with a roof over to form stores. There are also many roofs of corrugated iron. The sale and other pens are provided with roofs formed of iron, supported on iron pillars and filled in with concrete arches.

In the halls, places of sale, etc., the walls are often finished to a height of 6ft. 6in. for large cattle and 4ft. 6in. elsewhere with cement painted over with oil-paint or enamel, or glazed tiles, which of course give all the rooms a very fine appearance. Above this dado the wall is plastered and whitewashed.

The flooring must not be too smooth, lest the animals slip and fall; a rough cement covering is the best. The paths intended for foot passengers are usually of slabs. The footpaths leading to the stands and pens in the halls and stables must be sloped towards the central passages; there should be shallow gutters laid on both sides of the passages, out of which the waste water is led into gullies, and from thence into the drains. Ventilation is provided for by means of windows and air trunks made of zinc to prevent all danger of fire if there are fodder stores above the halls; these trunks should be provided with cowls, and air-openings in the surrounding walls which may be closed or opened at will. For the

same purpose the frieze under the overhanging roof can be made of perforated metal.

There should be an abundant supply of water-taps all over the place, a sufficient number of these being provided with hose connections. If the halls are only intended for the accommodation of large cattle, there should be barriers put along each side of the passages, 6ft. to 9ft. in width. These barriers can be of wood, but preferably of iron, and they should be fitted with rings. Every ox should have a stand 3ft. wide and 8ft. to 10ft. long, or a ground space (inclusive of paths, etc.) of about 50 square feet. At the head ends there should be a passage 4ft. 9in. to 6ft. 6in. wide; at the tail ends another 6ft. 6in. to 8ft. wide.[1]

The halls for *small beasts* (calves, sheep, goats, and pigs)[2] are usually outwardly similar to those for large beasts. Instead of the boxes, they are fitted with pens. The principal passages are 8ft. to 10ft. wide. From these branch off small side passages 4ft. 3in. to 5ft. wide.

These pens should accommodate at least ten animals in each; it is reckoned that a calf requires 1ft. 4in. to 1ft. 10in. standing room, and a sheep 10in. to 1ft. For the whole interior (including footway, etc.), 70 to 75 square feet can be reckoned for a calf, and 40 to 50 square feet for a sheep.

The pen enclosures, which are usually 3ft. 6in. to 3ft. 9in. high, can either be fixed or movable, and consist of slight iron railings resting on feet, and joined together by hooks and catches. The fixed railings can be of wood, but are better in iron.

In every pen there should be troughs of glazed earthenware, wood, or iron for the calves, and racks of wood or iron for the sheep, which are either double-sided and movable, or fixed into the pen walls, and made to pull up and down. Fig. 157 depicts the interior of the hall for small cattle at Leipzig, constructed by F. Moritz.

In the *swine* halls the enclosures should be of a material which can be thoroughly disinfected; iron cannot be approved of because if the dividing walls are railed, the animals are often disturbed and

[1] Osthoff reckons that in such halls 32 square feet should be the smallest and 55 square feet the largest space, allotted to every head of cattle. These halls usually contain *no* arrangements for fodder.

[2] In many cattle markets—Munich for instance—a special hall serves simultaneously for the sale of dead and living pork and veal. The situation, etc., of such rooms will be dealt with in the next chapter.

bitten by others close at hand, while corrugated iron is not suitable either, as the pigs are apt to knock against it and hurt themselves.

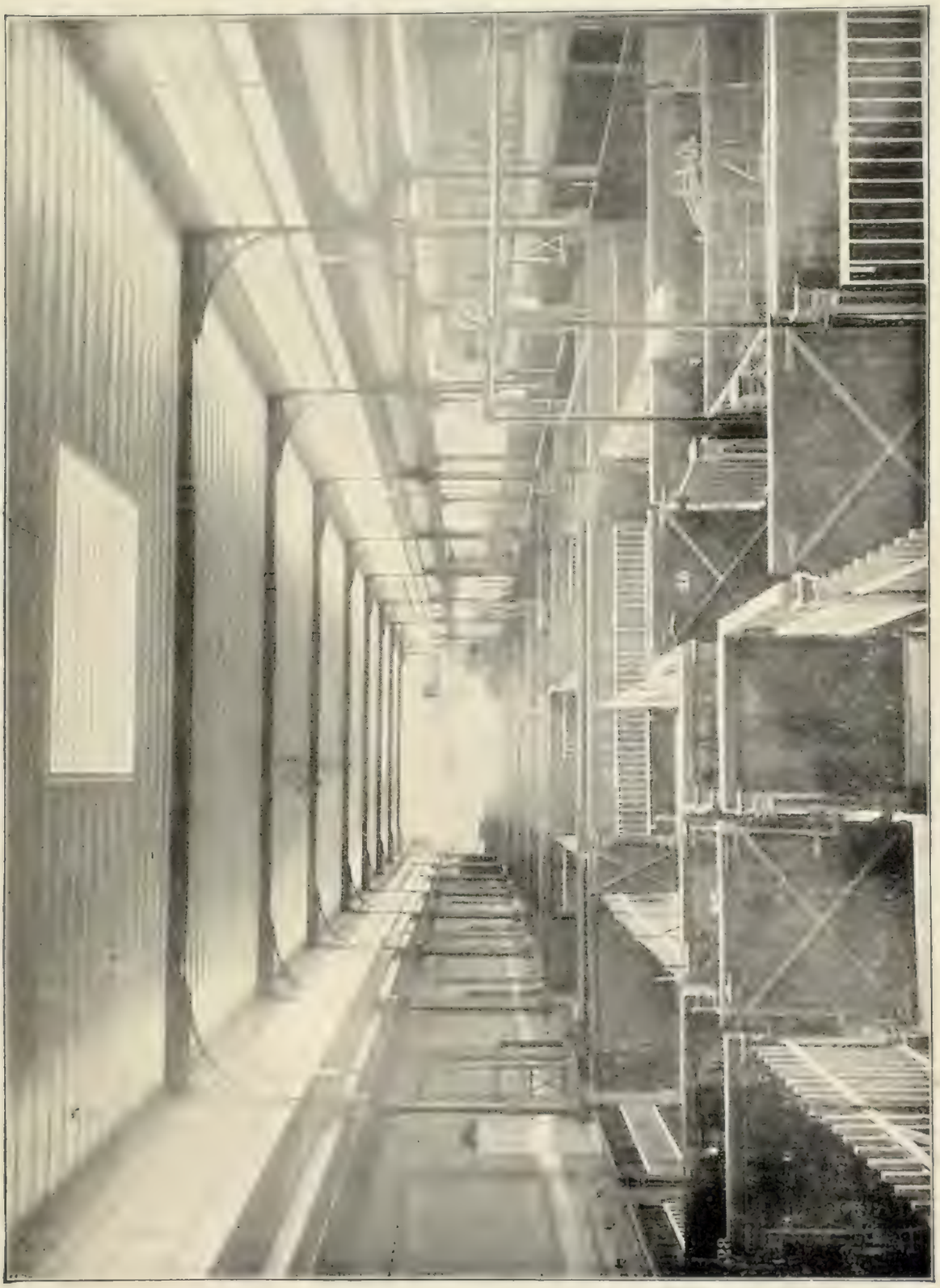


Fig. 157.

The best material to use is concrete slabs, stone and brick rendered with cement. A grating can be fixed at about nine inches above the floor, to admit of a current of fresh air.

For every pig there should be pen-room of 7 to 7½ square feet, and a total ground surface of 10 square feet (including footway).

Fodder bins are fixed on the walls adjoining the passages. They usually consist of glazed earthenware, cement, or iron troughs, provided with discharge-valves, over which iron traps are fixed which cover the troughs on the inside, when the animals are not to get any fodder. The doors of the pens, which should be 3ft. 8in. to 3ft. 10in. wide, should be constructed after the fashion illustrated in figs. 45 and 46. Fig. 158 shows the swine market-hall in the cattle-market at Leipzig.

In some cattle-markets washing-pens are fitted up in the swine halls, the walls and flooring of which are cemented.

The Pens.—In order to protect the animals in cold weather before, and in some cases after market day,[1] stalls are sometimes fitted up.

In some cattle-yards (Hamburg) the pens for small beasts are made in double tiers. The upper tier is intended for sheep, entrance being gained by sloping platforms.

In order to be able to keep the animals warm during market hours in winter, *sale pens* have been fitted up in some places, particularly in the north, on a lower level than the halls, and divided into compartments, and on the outer doors there are ventilators. Large cattle are not tied up to the barriers, but to the trough. Between every two troughs there is a fodder-rack 4ft. 10in. broad, which can be raised, so that the animal may be viewed from above. At the tail-end there is a passage 6ft. 6in. wide. The troughs, which are of brick, are mostly covered with cement or glazed material. These have discharge pipes, so that the superfluous water can be let into the gutters at the side of the footpaths; they have also rings attached to them to which the cattle are tied up. In order to prevent the fodder being thrown out on the pathways, the racks are furnished behind with an iron wall (see fig. 159, page 394). The troughs, which are provided with horizontal walls every 22ft. to 25ft., and also with perpendicular walls (for separating the food and water), are usually 1ft 4in. wide, and about 2ft. 6in. above the footpath. The rings are fitted about 1ft. 4in. high.

[1] In various cattle markets the animals stalled there are insured against fire: Mannheim, £10,000, on principal market days £15,000; in Munich (for cattle and killed meat), £36,500, etc., etc.

On an average there should be reckoned about 5 to 6 square feet ground surface to every foot wide of standing room. It is advisable

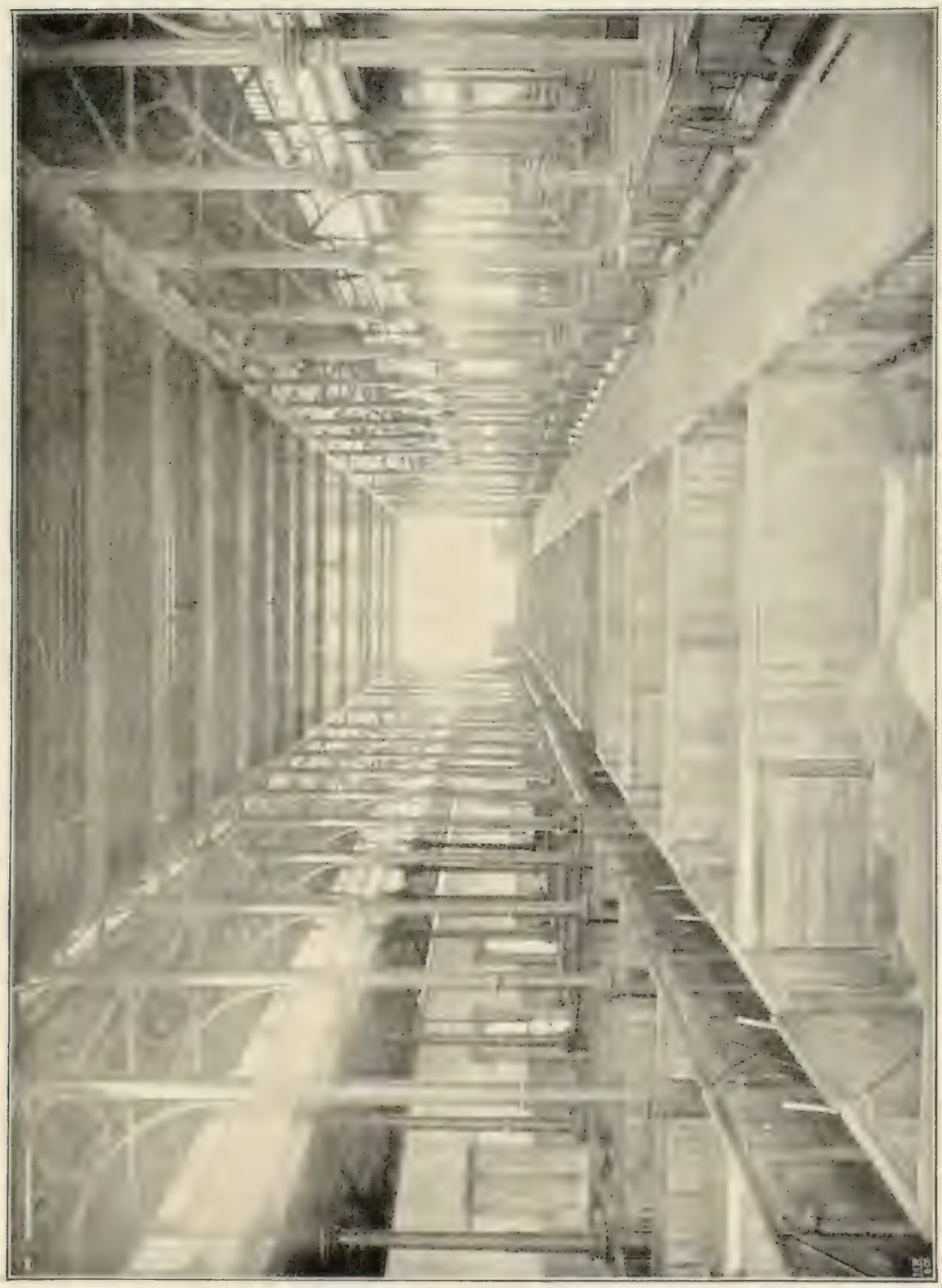


Fig. 158.

to divide the stalls into compartments, so as not to endanger the whole stable in cases of epidemics.

But it is not necessary that the pens should be nearly so roomy

as halls. Thus in some markets the two styles are combined, one-third of the building being fitted up as pens, and two-thirds as a hall.

Most cattle-markets have places for *foreign* as well as for home animals, particularly for pigs. These spaces must be separated as far as possible from each other. Hungarian swine were formerly accommodated in open sand-pens in the neighbourhood of the railway platforms. It was reckoned that each animal required a ground space of 16 to 21 square feet.

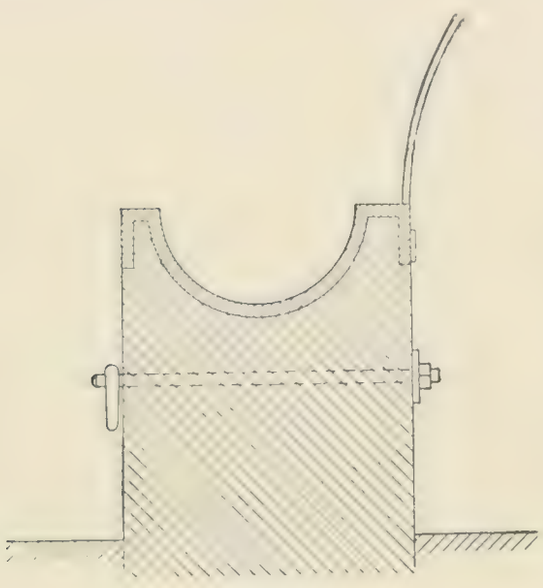


Fig. 159.

In the gable fronts of the halls or stalls are rooms for the overseer, the staff of servants, labourers, drivers, servants from a distance, etc.; also storage rooms for implements, etc. From thence a stair leads to the upper storey, where there are usually stores for fodder and straw, and dwelling-houses for cattle-yard officials. Suitable barrows for the transport of straw and fodder are illustrated by fig. 160.

In large cattle-yards there are kitchens for the preparation of drinks for pigs and calves. These are often connected with the washing rooms for the officials.

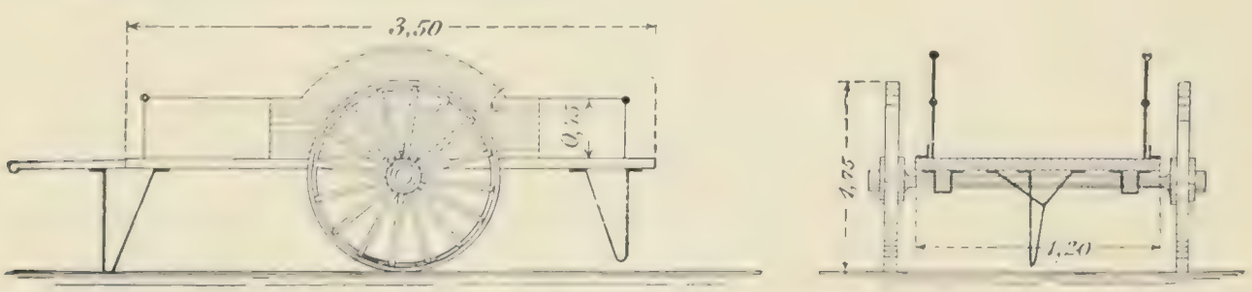


Fig. 160.

The *sanitary establishment*, which is usually situated between the slaughterhouse and the cattle-yard, and which has already been referred to in Chapter VI., serves for housing diseased or suspected animals until slaughtered.

It can be entered directly from either the slaughterhouse or the cattle-yard, is surrounded with a substantial wall, and is in direct

communication with a line of railway, so that injured or diseased cattle coming by rail can be received there, without coming in contact with any of the animals in the rest of the premises. The sanitary establishment is furnished with observation stalls, for the reception of *suspected* animals, unless there is an *epidemic-yard*, as in all the large cattle-yards. Sanitary premises and epidemic yards must be furnished with special loading platforms (see Prussian instructions). The latter is, of course, provided, like the sanitary establishment, with a great number of slaughtering spaces and stalls. A part of these serve for the accommodation of such animals as are seized on the cattle-yard with an epidemic, but are neither killed nor put under prohibition. Amongst such animals the foot-and-mouth disease may break out and necessitate a separation from the rest of the market cattle. The retention of those animals in the spaces reserved for the general market traffic renders cleansing and disinfection a difficult matter.

Before allowing such animals to return to the market another examination is necessary, the result of which is to determine whether they are to be driven out again or slaughtered.

For such animals a completely isolated court, surrounded by walls, can be erected. These are called "reserve stalls," and are to be found in Cologne. This portion, as has been already mentioned, is fitted up with disinfection arrangements for the persons frequenting these premises.

In Nuremberg there is by ministerial approval a special "foreign cattle-yard," so as to avoid a complete closing of the cattle-yard proper in the case of the outbreak of an epidemic. In Berlin five lairages have been built for this purpose, capable of putting up 1,320 oxen.

It is not advisable that arrangements should be made for the sale on the cattle-markets of animals other than for slaughter, because of the great danger of contagion and the spreading of epidemics.

Branch Railway Lines and Platforms.—Where there is a connection with a railway line, and a branch either passes along the side or cuts through the middle of the cattle-yard, special care must be exercised in the arrangement of the platforms, etc., especially in the importation of foreign cattle. In small cattle-yards two lines are necessary—one for the unloading of waggons, the other for their

cleansing and disinfection. In larger establishments there should be three or four.

The disinfection track must be fitted up with an impermeable bottom and a system of drainage, and must have a hot water connection close at hand. The water, with which a disinfectant has been mixed, should be led in closed pipes from the water-tower.

In large cattle-yards (Magdeburg, Cologne, etc.), there are special premises fitted up for the cleansing of the cattle waggons having warm-water tanks with pipes, to which hydrants are attached. But it is best to leave their cleansing and disinfection to the railway company, because then they have the management of the whole branch line, as is done in Halle.

Almost everywhere a tax is levied for the *use of a railway line*. In Barmen this amounts to 4d. for every large beast, 2d. for each pig, and 1½d. for each small beast, etc., etc. In Barmen 4d. extra is charged for each ox and pig, and 1½d. for each small beast for the *use of a railway platform*.

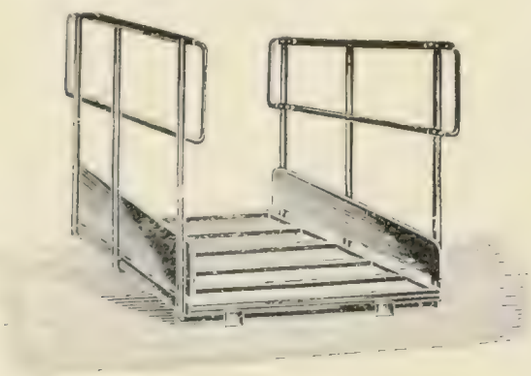


Fig. 161.

The *landing platform*, which is divided into separate parts for the various species of cattle (large beasts, small beasts, swine), is raised about 3ft. 4in. above the level of the line. It is formed with a dwarf wall, capped with strong castings. The surface must be covered with impermeable cement, asphalt being poured into all the fissures, so that disinfection may be easily and certainly accomplished. Granolithic is a thoroughly impervious material; coke breeze concrete is not to be recommended, as it gets too smooth and porous in the course of time.

The platform is divided into two parts—the gently inclined landing-stage and the pens. The former stretches from the edge of the line to the pens, and is usually about 4ft. 6in. to 9ft. broad (narrower for small beasts than for large). The pen portion, which is on a slope of 1 : 10 to 1 : 18, abuts directly on the front wall, so that the pen doors, which fall downwards towards the outside, form a passage along which to drive the animals from the railway to the pens and *vice versâ*. Special gangways are also

used for this purpose (fig. 161). The pens, usually 18ft. deep and 12ft. to 15ft. broad, are enclosed with very strong wooden bars and one or two bolts. Unless these are made of the best oak, iron is unquestionably preferable for the purposes of disinfection. For small beasts and swine an iron railing also is advisable.

In Cologne the pens are 24ft. long, 18ft. broad, and 4ft. high. The two-winged doors are 7ft. 6in. broad. The posts are round cast-iron columns of $4\frac{1}{2}$in. diameter, and $\frac{3}{8}$in. thick, the upper bars being of galvanised iron tubes $2\frac{1}{4}$in. diameter and $\frac{1}{8}$in. thick, the lower bars being $1\frac{3}{4}$in. diameter. The floor is laid with hard-baked tiles, having grooves $\frac{1}{8}$in. deep.

There is always an examination of imported animals in these pens. After this is effected the animals are driven into the halls or stalls. It is advisable to have two landing stages, one behind the other, for driving the small beasts up and down. A special driving road should also be fitted up, which must not cross that intended for the use of the export cattle (see Prussian instructions).

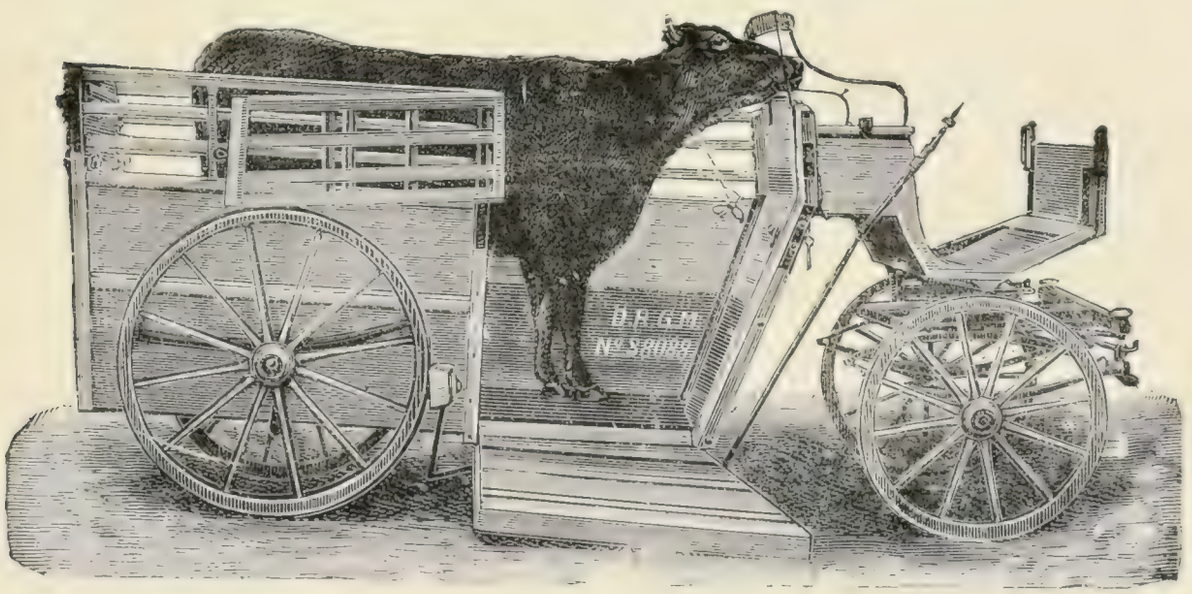


Fig. 162.

Hydrants with hose attached should be fitted up for the cleansing of the platforms and playing upon the swine in summer.

In *cattle markets* it is advisable to have trucks for the transport of the animals, and also weighing machines fixed up at the entrance to the halls. Both have already been referred to at length in Chapter VI., but in the cattle markets there are some trucks running on narrow-gauge rails which deserve special mention, which are used in many slaughterhouses.

In America for the conveyance of the very obstinate animals they use an arrangement like a huge pair of pincers, ending in two grated claws which are made to catch into the ribs of the pigs. With these pincers the animal is seized from above, without hurting it in the least, the pincers are closed and carried by two men to a landing stage, without any regard to the noise the animal makes, as it suffers no hurt.

A number of useful trucks have been constructed for the conveyance of large beasts.[1]

The simplest transport waggons are those from which the animals have to be unloaded backwards, a disadvantage which is avoided in the other systems. In the truck shown in fig. 162, page 397, the animals can be led in by the head, and led out in the same manner through a side opening with doors that fold down, and at the same time serve as a gangway.

Management, Inspection, Taxes.—The management of the cattle-market is principally in the hands of the slaughterhouse director if it is a municipal institution. Some of the slaughterhouse officials can be employed on the cattle-market on certain days of the week, when there is a stress of business there, and not much to do in the slaughterhouse.

The management is regulated by special cattle-market regulations, and those in force at Halle are a good model.

The veterinary police control and inspection of animals driven therein are conformable to the laws of June 23rd, 1880, and May 1st, 1894, and particularly to that of June 18th, 1894, relating to the district veterinary experts in Prussia. In most of the other

[1]Much mischief is still done to cattle in the course of railway transport, and the beasts must suffer. This question has been exhaustively treated by Clausniter, of Dortmund, and A. Keller, of Jäggi. Most cattle waggons are too narrow, and the ventilation, the arrangements for feeding and watering the animals, the manner in which they are secured, the attendance they receive are all at fault. The regulations issued by the Chancellor of the Empire on the 13th June, 1879, for the railway transport of living animals, do not offer protection, whereas those which became valid in Switzerland during 1888 are worthy of imitation.

The "stock cars" of America are admirably arranged transport trucks. These are constructed on the "stall truck" system, and there is no lack of good fodder and drinking arrangements, and there is admirable ventilation as well as special quarters for those in attendance.

Dorn, of Catford, constructs a patent *railway cattle transport truck*, which can also be used as a common goods waggon. These trucks have two bottoms, the lower of these being made of wooden cross-bars which form channels, and the upper part being made in leaves to open and shut. In the transport of cattle these leaves serve as dividing walls. The water troughs can be pushed perpendicularly against the side walls and fixed at different heights under the roof of the trucks when not in use. The hay racks can also be folded up against the roofs of the trucks and securely fastened.

Confederate states the cattle-market and slaughterhouse managers are invested with the functions of official veterinary surgeons.

In the Grand Duchy of Hesse the ministerial decree orders the employment of a second veterinary expert, should the business of the market amount to more than five hundred head of large beasts. Two head of small beasts are reckoned for every large beast.

Below is given a table of the market dues to be levied for a stand on the municipal cattle-markets, while on page 400 is given a table for stalling, feeding, and weighing.

In the preparation of a tariff of dues "cattle-yard" must be distinguished from "cattle-market," for as by the latter is only understood a place erected for traffic with cattle, the taxes for the use thereof can only be levied according to the law of 26th June, 1872, and the ministerial decree of June 10th, 1872, concerning the levying of market stand tolls, and must not exceed 3d. the square metre, according to par. 2, Part I. of this law. According to Part II. of the same paragraph, this rule is also applicable to objects

MARKET TOLLS FOR PUBLIC CATTLE MARKETS.

Name of Town	Horse.	Bullock.	Calf.	Sheep.	Lamb.	Goat.	Kid.	Pig.	Porker.
	d.	d.	d.	d.	d.	d.	d.	d.	d.
Barmen ..... { Over 2cwt.	5d.		$1\frac{1}{2}$	1	—	1	—	2	—
Barmen ..... { Under ,,	3d.								
Berlin.....	—	$1/0\frac{1}{2}$	7	—	—	—	—	5	—
Beuthen.....	6	6	$1\frac{1}{2}$	1	—	—	—	$2\frac{1}{2}$	—
Bonn	—	5	1	1	1	1	1	2	—
Bremen	5	10	2	1	—	$\frac{1}{2}$	—	5	—
Bromberg	4	4	1	1	1	1	1	2	1
Breslau	—	1/5	5	3	—	3	—	8	—
Danzig	—	1/1	5	5	—	5	—	7	5
Dortmund.....	5	5	1	1	—	1	—	2	—
Frankfurt a/M..	—	10	2	2	1	1	1	4	1
Freiburg i/B....	3	3	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Hagen.....	—	3	1	1	1	1	1	1	$\frac{1}{2}$
Halle a S.	—	10	4	3	—	3	—	5	—
Hamburg	5	10	$4\frac{1}{2}$	1	1	1	1	2	—
Cologne	6	8	$1\frac{1}{2}$	1	—	1	—	3	—
Königsberg i Pr.	1/-	6	2	2	2	2	2	$2\frac{1}{2}$	1
Leipzig	—	1/3	4	3	—	—	—	$7\frac{1}{2}$	—
Lübeck	5	5	2	2	2	2	—	2	—
Mannheim.....	$2\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$
Munich	10	10	3	1	$\frac{1}{2}$	1	$\frac{1}{2}$	3	$\frac{1}{2}$
Nuremburg	10	10	2	1	1	1	1	3	1
Stolp i P.	2	2	1	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$\frac{1}{2}$
Wiesbaden.....	7	7	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$\frac{1}{2}$
Zwickau.....	—	1/8	5	4	1	—	—	10	—

which are neither sold on tables nor in booths, thus including animals. According to the ministerial decree already cited (No. 10), the following figures are given for the space occupied by the animals in question: For horses, oxen, or asses, about ten square feet = 1½d.; fat swine, five square feet = 1d.; young swine, goats, sheep, calves, two and a half square feet = ½d. each.

LAIRAGE, FORAGE, AND WEIGHING TOLLS FOR LIVE ANIMALS (IN PENCE).

Town.	Cattle.			Pigs.			Small Animals.		
	Lairage.	Forage.	Weight.	Lairage.	Forage.	Weight.	Lairage.	Forage.	Weight.
Briesen	1½	—	2	1	—	1	½	—	1
Bromberg	1½	4	2	1	—	1	½	1	1
Cleve	2	5	4	1	3	2	1	2	1½
Crefeld	1	3	3	1	1½	2	½	½	1
Cüstrin	2½	—	—	1	—	—	1	—	—
Dortmund	2½	—	2½	1	—	1½	1	—	1
Eisenach	1½	—	5	¾	—	3	½	—	1
Elbing	2	—	2½	1½	—	1	1	—	½
Freiburg i/B.	3	5	5	1½	5	4	1½	4	2
Gotha	1½	—	—	½	—	—	½	—	—
Göttingen	1½	5½	—	¾	—	—	½	2	—
Grunberg (Schl.)	2	—	5	1	—	2½	—	—	1
Hagen	2½	—	3	1	—	2	1	—	1½
Hamburg	5		3	1¾		1	1		1
Harburg	2	2	5	1	—	3	½	2	1
Hildesheim	1½	5½	5	¾	—	3	½	2	1
Cologne	3	—	2½	1½	—	1	1		½
Königsberg i/P.	2½	—	4	1	—	2	½	—	½
Lüneberg	2	2	5	1	1	3	½	½	1
Munich	2	—	2½	½	—	¼	½		¼
Neustadt W/Pr.	2½	—	3	1½	—	2½	1	—	2½
Neustrelitz	2½	5	5	1½	2	2½	1	1	2½
Nuremburg	1	—	10	½	—	2½	½	½	1
Riesa	3	1	3	2	1	2	1	1	1
Schönsee	1½	—	2	1	—	1	½	—	1
Stolp i/P.	2	1	10	1	½	2½	½	½	1
Werden (Ruhr).	3	5	5	1½	4	2	1	2	1½
Wesel	3	—	5	2	—	2½	1	—	1
Wittenberge	2	5	4	1	—	2	½	1½	1

But these rules do not hold good for a *cattle-yard*, that is, *a walled establishment in the private possession of the parish, not free for general use.* Such a cattle-yard is to be regarded as an "industrial institution" belonging to the community, and is to be managed according to par. 3 of the Corporation Laws, so that the entire expenditure of the undertaking be at least covered by the income.

The regulations for such undertakings cannot be settled independently by the corporation, and the *approval* of the *district committee* is not sufficient.

Remarks on Cattle Dealing, the Needs of the Trade, and Proposals for Reform.—As there are special usages in the trade with slaughtered animals, such as sale according to slaughter-weight or meat-weight, etc. (see Chapter XI.), so there are different standards in trading with living animals.

Almost every large place of sale has its own usages and corresponding notifications of price, so that it is scarcely possible for dealers, much less producers, to form a correct judgment as to the conditions of the various markets. Here they sell by "slaughter-weight," there by "meat weight"; here by "live-weight *with* a certain deduction," there "*without*" such. In other places sales are "according to the animal"—"by the head," "by hand," "on feet"—that is, without any weight. As well as these general terms, there could be added local designations for single portions obtained at slaughter, which play a part in the fixing of prices.

In the same way the various qualities or classes differ in price.

It is therefore easily explained from this jumble why there is such an effort being now made to institute a uniform scale of prices founded *exclusively by live-weight.*

For facilitating this, the German Agricultural Council passed the following resolutions at its twenty-fifth general meeting in 1897:

Care must be taken—

1. "That the '*standard use of the living-weight*' be carried into effect in all large slaughterhouses."

Nothing new is demanded herewith in any particular, for in Vienna and all over America, where the butchers' industry and cattle-dealing are in a most flourishing condition, no other system is known than sale by live weight. For this purpose it is necessary that there should be official weighing-machines not only in all the cattle-markets, but also in the premises of cattle-dealers and breeders. These should also be fitted up at the entrance of the already mentioned collecting-stations.

2. "That, where owing to ancient custom the use of both slaughter-weight and live-weight are continued, these weights must bear a uniform proportion the one to the other.

This resolution was also agreed upon by the conference of slaughterhouse managers, representatives of the agricultural industry, and cattle-dealers held in Berlin in 1896.

3. "That the official standard be settled by a special commission consisting of representatives of the combined interests, and published after the market closes."

In Berlin and in other places the notification of the prices is almost arbitrary, as the publication of the stipulated notice is first the product of appraising or over-valuing and reduction. As a fact, it is the rule to fix the price for oxen at so much *per head;* this price is then reduced by valuation to the probable dead weight, and thus the prices are brought to the knowledge of the municipal or police officials, and the "official notice" is "fixed" "*under the influence of the agents.*" The final result of the "official notice," then, depends first on the honour of the interested dealers, then on the subjective appraising of the meat-weight; further, on the activity and wariness of the officials, and, finally, on the influence of the big agents.

But agriculturists can rightly demand to have an influence in the settlement of prices, for according to par. 2, Part IV., of the Agricultural Laws of 30th April, 1894, the agriculturists are entitled to take part in the management of the produce exchanges and the markets, especially *cattle-markets.*

A co-operation of this kind could best be achieved by appointing a "market committee" for every cattle-yard, to which should be sent a municipal official (manager of the slaughterhouse), an agriculturist (a landlord), and a master butcher. This committee would prepare the market report in accordance with the closing prices, and act as a court of arbitration in cases of necessity.

4. "That the published prices be for equal quality and classification."

Until lately the qualities have been classed very simply, for which no special principles have been laid down. These were different in every cattle-yard, but were also variable according to the fluctuations of the industry.

Therefore, at the above-mentioned conference the following classifications were fixed, and all the cattle-yard managements were recommended to introduce them :

Oxen : 1. Full-bodied well-fed oxen of prime value up to six years of age.
2. Young, fleshy, not thoroughly fattened ; older and well-fattened beasts.
3. Moderately well-fed young beasts ; well-fed old beasts.
4. Inferior animals of any age.

Calves and Cows : 1. Fleshy, thoroughly fattened calves of prime value.
2. Fleshy, thoroughly fattened cows of prime value up to the age of seven years.
3. Old, thoroughly fattened cows, and less well-developed young cows and calves.
4. Moderately nourished cows and calves.
5. Inferior cows and calves.

Bulls : 1. Fleshy animals of prime value.
2. Moderately nourished young and well-nourished old beasts.
3. Poorly fed beasts.

Calves : 1. Finest fed and best sucking calves.
2. Moderately fed and good (young) sucking calves.
3. Inferior.
4. Older ill-fed beasts.

Sheep : 1. Fed lambs and young well-fed sheep.
2. Older fed sheep.
3. Moderately nourished beasts.

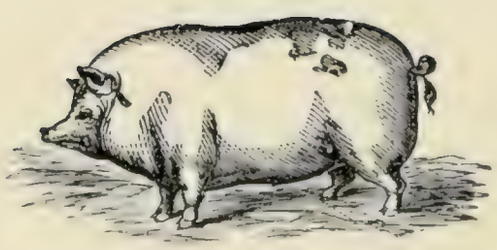
Pigs : 1. Prime beasts up to one and a quarter years.
2. Fleshy.
3. Poorly developed, also sows and boars.
4. Foreign.

This standard is kept to in the notification of the living weight in the cattle-yards at Berlin, Danzig, Dresden, Heilbron, Leipzig, and Mannheim.

5. "That market regulations be drawn up for all public slaughter and cattle-dealing places, by which the traffic will be regulated and the local usages be officially defined. Before issuing these market regulations, the representative bodies of the agricultural industries must be given an opportunity to discuss and advise thereon."

To prevent the trade being monopolised by large dealers and agents, public agency and balancing offices should be erected which could settle private dealings, and appoint brokers. With this office there should be connected an insurance company, branches of which should be in all public slaughterhouses.

Further, a central authority should be established as to cattle traffic for slaughtering purposes, whereby the reports sent up from all the slaughterhouses and cattle-yards could be subjected to a general oversight, and by which they should be made public. Such an arrangement would be equally valuable for the preservation of every interest affected.



CHAPTER XV.

THE MARKET-HALLS.

Although there is only a slight connecting link between the markets for the sale of meat and the slaughterhouses, some reference must be made to the former here, because we often find in them "inspection stations" for fresh meat killed outside and brought in afterwards.

Very possibly the first markets, especially the annual markets, arose in Germany in the fifth and sixth centuries in the neighbourhood of great bishops' seats and places of pilgrimage, where it was necessary that opportunity should be given to the crowds of pilgrims who flocked thither to buy food and other things. We know for certain that in the ninth and tenth centuries the above-mentioned places were continually besieged by merchants of all sorts; perhaps this is why it is that in some places the open spaces under the shadow of churches are still covered with booths (Danzig, Augsburg, Landsberg, Frankfurt-on-Maine). When these places were given up for various reasons, efforts were made to obtain spaces which would give both sellers and buyers every convenience, security, and protection against wind and weather. Thus arose guildhalls and storehouses. One of the earliest mentioned of such market-houses is that adjoining the Abbey of Corvey in 950, and this notice is the only evidence for the assertion that market-halls were first situated in the neighbourhood of churches. The next accurate account of the building of any large market-house is that of a market-house founded by the Germans in Venice in 1268, and the next of one in Strasburg in 1358. A reference made in the account of the latter proves that in the twelfth century there were already common market-houses, and in the records of the various guilds mention is made of "meat-stalls," "Freibanks," "booths," etc. These were usually in the possession of the town and were let to butchers. In some towns, especially in South Germany and Switzerland, where these meat butchers bore the name of *metzig* (as was mentioned in Chapter I.), slaughterhouses

and meat-stalls were built adjoining or close at hand to each other. In isolated cases these were the property of the butchers.

All these buildings were equally convenient for buyer and seller; they were usually in the middle of the town, in the principal and busiest places. France takes the first place in the laying out of meat markets, as also in the erecting of slaughterhouses. In Paris the first great market-hall was erected at St. Germain between the years 1811 and 1822; after this there arose a great number, the principal of which is the central market. In Belgium, England, and Italy there are a great number of towns with market-halls; in England many of these belong to private parties.

In Germany market-halls on the new style are of still later origin than slaughterhouses. This is especially true of Berlin, where fifteen have been erected since 1886, etc., etc.

There is not space to enlarge here on the interior arrangement of market-places, their management, dues, and productiveness.[1]

The advantages that covered halls have over open market-places are so important that every town of any size should transfer the market traffic to closed rooms, which would not only protect buyers and sellers, but also the wares from the influences of the weather, heat and cold, dust and smoke. Not only would the goods keep better and longer,[2] but special arrangements could also be made for their preservation by having single or common cellars (divided into compartments) below the market-place, and in larger premises these could be fitted up with refrigerating machinery, the installing of which would offer no more difficulty than that of other arrangements, such as electric light, hydraulic lifts, steam engines, etc. Such refrigerating arrangements have been fitted up in the market-halls in Dresden, Leipzig, Prague, Vienna, and Lübeck, also in the new wholesale market in Berlin.

These markets by this means become of the highest economic importance, for no more suitable means of preservation could be conceived, as has already been exhaustively explained, than by dry

[1] All information will be found on this subject in Book VI. of the "Handbook of Hygiene," by Th. Weyl, Jena, 1894, where Osthoff writes on "Establishments for Froviding Towns with Articles of Diet."

[2] Hofmann reckons the loss in articles of diet by waste to be about ten per cent. yearly, which for a town of 100,000 inhabitants amounts to £50,000

cool air generated by refrigerators. The possibility of being able to keep his goods in the best of condition for a considerable time enables the seller to keep up his prices without the fear that they will spoil by keeping.

Further, the markets are important hygienically; for the refuse often left behind in open market-places, and exposed to the influence of the sun, does not make for the improvement of the air, while the spaces left vacant by the transfer of the traffic to closed market-places can be utilised as flower gardens or public parks.

The length of time allowed for business in covered markets is an improvement on the open market-places, for it is possible for the buyers to have the whole day in which to purchase, while on the other hand the dealers themselves do not need to force their sales.

Then the sanitary police control of all articles of diet is rendered much easier, while at the same time the salesmen can act as a check on each other in a higher degree than formerly.

If practicable, it is well to have the market connected with a railway line, in order to avoid unloading more goods than are required and to facilitate competition. Thus the dealers, particularly in large towns, will be offered the possibility of procuring products from a distance, as importation from the direct surrounding district seldom meets with all requirements. Only by a favourable connection with distant localities can raising of prices be prevented. At the same time there will be a great increase of dealers where there is offered a productive and assured place of sale.

Of special importance in the provisioning of large towns are the newly invented and lately-perfected ice waggons, by means of which every imaginable article of diet, even living fish, can be transported during great heat. We have also a number of preservative systems for the transport of fresh meat, but it would lead us too far to go into these here.[1]

[1]The reader is recommended to consult an article by the author on "Meat Transport Waggons, with special reference to the Cooling Arrangements," which appeared in the *Zeitschrift für die gesammte Kälte Industrie* (Nos. 7, 9, and 10). The principal points dealt with, as well as the illustrations referred to, were also published in *Ice and Cold Storage*, Vol. I., Nos. 7, 8, and 9, and Vol. II., No. 10.

Like all public institutions destined for the common good of the people, markets will only become really useful and fulfil their purposes completely when they are no longer, as is often the case at present, objects of private speculation but are municipal institutions, because it is only thus that full guarantee is offered that public interests will not be set aside for the pecuniary advantages of individuals.

In the larger towns the markets have in connection with them—*examination stations for meat killed elsewhere and brought in for sale*, especially if the slaughterhouse lies off the principal road taken by the outlying butchers.

For the purpose of meat inspection one large and two small rooms are needed—the former having egress to the drovers' road, as here the meat for inspection is hung, while one of the two smaller rooms serves for trichinosis inspection and as an office, and the other is intended for the inspecting veterinary expert. But if the inspection is to take place in the slaughterhouse, there should be for this purpose a room as near to the main entrance as is feasible, which offers sufficient space, light, and ventilation. It is well not to stint space in such rooms, or else the inspecting official loses oversight of the crowd of tradesmen who almost always arrive at once; the walls and flooring here must also be of an easily cleansed and disinfected material, and there must always be a good supply of water. Further, the cold water taps must be fitted with hose. There must be plenty of space for the waggons. But in general a special inspection room of this sort is not required in the slaughterhouse, because the inspection of this meat can easily be accomplished in the slaughter-halls for small beasts or pigs, especially in the early morning hours, and more particularly on market days, when the goods usually arrive, there is little or nothing done in the slaughterhouse. Even where there is only a common hall for large and small beasts, there is always sufficient room for inspection. In cases of necessity the spaces for slaughter can be separated from those intended for inspection by wooden barriers. Such halls for inspection do not create any special expenses, and are in every case more spacious and more practically fitted up than most places arranged for the purpose, while in many, especially of the smaller slaughterhouses, not only is there a lack of light and of air, but the rooms would be more suitable for almost any other purpose than for meat inspection.

Settling of the Tariff.—On the 18th June, 1898, the Chief Court of Administration arrived at a highly remarkable and t enchant decision regarding the balance-sheet of the slaughterhouse, which runs thus:

"For the proper apportioning of the dues, the cost of the inspection of the cattle that are or shall be killed in the slaughterhouse and the cost of the inspection of imported cattle are to be *separated* from the expenses for management and upkeep. When the inspection expenses are not only neutral but personal, then also a part of the salary to be paid to the inspecting officials must be taken into consideration. The inspection expenses are to be again divided into that which falls to the share of the imported meat and that which belongs to the meat killed and inspected in the slaughterhouse; the sum total of the latter shows the highest amount sanctioned for the dues for the inspection of cattle and not of imported meat. The inspection dues for imported meat may on the other hand exceed the prime cost, according to par. 11 of the Communal Laws. Only the actual expenses of management and upkeep must be rated in the costs. Expenses for the upkeep of the general offices and other municipal administration, police control, etc., can not be shuffled on to the slaughterhouse management. *Uniform average rates are admissible*, instead of altering them by the ever varying expenses of management and upkeep, but the *accumulation of a fund* for other than purposes of management and upkeep, especially for *building enlargements*, is *forbidden*. The amount of the expenses of management and upkeep to be ascertained as directed, and in addition eight per cent. on the capital and of the indemnification sum is the proper sum to guide one in the apportioning of the dues. A *reduction* of that sum by the surplus of the inspection dues for imported meat is not to be allowed; the surplus is not obtained by the slaughterhouse business in the narrow sense, but by inspection, which is to be kept apart from the other business."

APPENDICES.

The preceding portion of this work has been arranged to follow the original as closely as possible, and consequently many large abattoirs and markets worth considering have not been referred to. To make good these omissions five typical establishments have been selected, which will allow comparisons to be made between the systems adopted in various countries.

It might also be remarked here that the refrigerating machinery previously referred to, does not include many machines made in various parts of the world, and which are fully noticed in the technical journals devoted more particularly to the refrigeration industry. The same remarks apply to destructors and other matters of less importance.

No. I., page 413.—Description of Glasgow Cattle Markets and Abattoirs.

No. II., page 443.—Description of Leeds Abattoirs.

No. III., page 449.—Description of La Villette Cattle Market and Abattoirs, Paris.

No. IV., page 459.—Description of Odense Export Slaughter-house, Denmark.

No. V., page 461.—Description of Anderlecht Abattoirs, Brussels, Belgium.

APPENDIX I.

CITY OF GLASGOW CATTLE MARKET, ABATTOIRS, AND FOREIGN ANIMALS WHARF.

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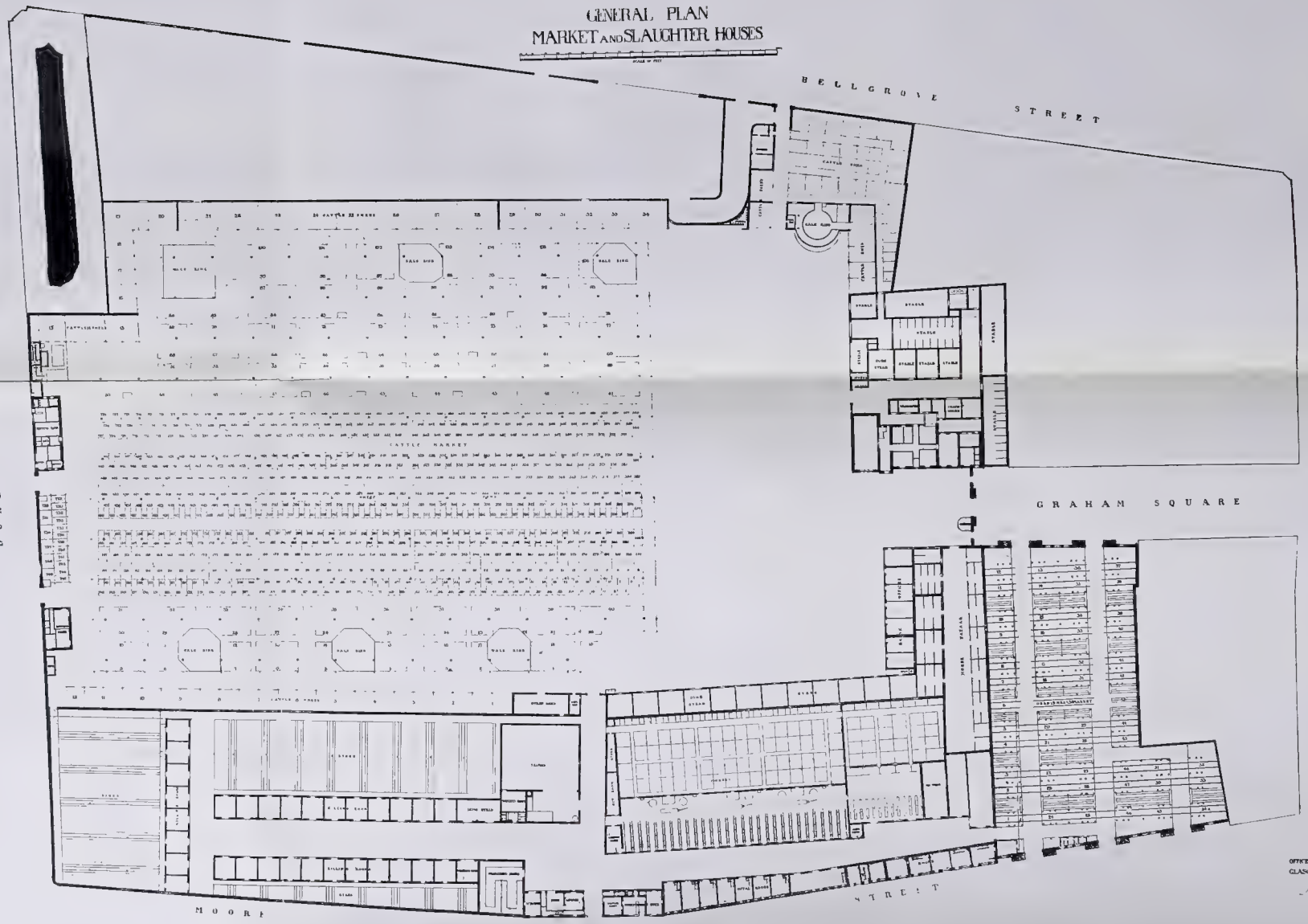

Fig. II. CATTLE MARKET AND ABATTOIRS, MOORE STREET, GLASGOW.

APPENDIX I.

CORPORATION OF GLASGOW
(MARKETS DEPARTMENT).

DESCRIPTIONS AND MEMORANDA CONCERNING
THE MARKETS, THE ABATTOIRS, AND THE
FOREIGN ANIMALS WHARF.

The city of Glasgow, the principal business centre of Scotland, has the advantage of possessing in its midst the largest cattle market

Fig. I. Mr. ROBERT WALKER, Superintendent,
Glasgow Cattle Market and Abattoirs.

and public abattoir in that country. The market dates back to very

Fig. III. GLASGOW CATTLE MARKET.
Covered portion with accommodation for 300 cattle.

early times—so early, indeed, as to be obscure. It seems certain that the first charter was granted to Bishop Jocelin between 1175 and 1178 by William the Lion (1165—1214) giving him the right to have a burgh in Glasgow with a *market* on Thursday. Since that date, however, there have been many charters and changes, to suit other times. At the present time the weekly market is held on Wednesday. The market accommodation provided is very plentiful, the area covered being 32,250 square yards. Part of this space is covered by roofing and fitted up in a complete way for the accommodation of 300 cattle, which are kept separate, the one from the other, by iron posts. The flooring is of Locharbriggs freestone, and water is laid on throughout the entire space.

The system of selling is mainly by auction, and, as is shown in the ground plan (fig. II.), there are sale rings provided for this purpose. During recent years there have been many disputes between the Fleshers' Association and the Corporation over these same rings. The great development of co-operation in Scotland, as elsewhere, has alarmed the fleshers, and, looking to the interests of their trade, they have disputed the right of the Corporation to allow the representatives of co-operative societies to bid at these sale rings. Much bitter feeling has been exhibited on both sides, and the "rights" of each party have been tested in the law courts, with the result that the question seems to rest in the same state as before the disputes began, and it has been laid down that the Corporation property, being the property of all, cannot be diverted solely to the use of a portion of one trade, to the exclusion of any other portions.

Cattle, sheep, and pigs are disposed of in the market by auction, and from the tables we publish at the end of this note it will be seen that the time allowed for selling is brief, so that the work must be expeditiously done.

Next to the market are placed the abattoirs, covering 13,695 square yards. Some of these are not in a very substantial condition, and might with advantage be rebuilt according to modern practice, and no doubt this will be done. In Glasgow we expect to find progress, if anywhere! The more modern of the slaughtering booths are fitted up with hydraulic lifts (see fig. IV.), but these do not seem to be very popular amongst the men. The system of slaughter of

Fig. IV. GLASGOW SLAUGHTERHOUSES.
Interior of a cattle slaughtering booth.

Fig. V. GLASGOW SLAUGHTERHOUSES.

Pig Slaughtering Abattoir. Showing scalding tank, hydraulic crane, scuttling table and (on the floor) some pigs that have been skinned.

Fig. VI. GLASGOW SLAUGHTERHOUSES.
Tripery.

the cattle is by the pole-axe, there being no masks in use. In the same slaughtering booths sheep and calves are also slaughtered.

What is termed the "Piggery" has been recently reconstructed, and it forms a large department by itself. The pigsties, with a capacity for 1,200 pigs, are alongside the slaughtering room (fig. v.) The system of slaughter is after the German style, but without the knocking down or stunning process. The present process is altogether objectionable, and could be improved very much, and the work could also be much expedited. At present the pigs are thrown down and killed by being stabbed in the throat in the direction of the heart, the main blood-vessel, or *aorta*, being thus severed.

The system which commends itself to us is that which has been adopted by the Corporation of Dublin and other corporations,* and which is also in use in the bacon factories throughout Europe. The pig is swung quickly by one of the hind legs on to an overhead track bar, and is instantly despatched when hanging, head down. The blood flows out very quickly, and there is no time lost. In Glasgow piggery the arrangements for handling the pigs after slaughter are also after the German model. There are hydraulic cranes for lifting the carcases into the scalding tank, and again out of the scalding tank, on to the scuttling table.

Skinning pigs (fig. v.) is carried on, with a view to providing skins for making saddle leather. This is a very large industry in Scotland, and the Glasgow abattoir supplies a good proportion of the raw material.

The "tripery" (fig vi.) is a large department, but is not modern. In the near future it will be fitted up, it is expected, with more modern fittings. As it is, however, mechanical cleaning is adopted, and this enables work to be done rapidly.

The "search house" is a place where the fat or tallow is searched or assorted—all the "searchings" being claimed by the Fleshers Association, and, as a matter of fact, bringing them a very large income.

There is also a blood and albumen department let out to a private contractor. The business of serum-making has very largely depreciated during recent years, and the once large profits are disappearing fast.

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*See footnote page 107.

Fig. VII. GLASGOW DEAD MEAT MARKET.

The "Meat Inspection" Department is under the care of a skilled veterinary surgeon, who also has several assistants constantly examining live animals and the carcases after slaughter. There is, however, no provision made for the destruction of condemned carcases, these being sold, after being treated with peroxide of iron and picric acid, to a private contractor.* This system seems to be capable of improvement. Doubtful meat should not be allowed to go out of the gate of the abattoir as meat at all, but should be worked up under the supervision of the abattoir authorities. Besides the amount of money obtainable for condemned meat at present is so very small that an increased return to the fleshers would follow the adoption of a "condemned carcase utilisation" plant.†

The "Dead Meat Market" (fig. VII.) adjoins the abattoir and covers an area of 4,246 square yards. It contains fifty-four stands, let out to wholesale fleshers, who are charged ¼d. per square foot per week for the area occupied, besides having to pay dues on all carcases exposed for sale.

The series of statements of assets and byelaws, as also the illustrations, etc., which follow, will, we think, be useful as showing what has been found necessary in a large Scottish abattoir.

The whole business is under the control of a superintendent (Mr. Robert Walker), who is responsible to the council.

ASSETS (GLASGOW MARKETS).

As at 31st May, 1900.

I. HERITABLE PROPERTY—

CATTLE MARKET AND INN—					
35,250 sq. yds. ground, at 30s.,	£52,875	0	0		
Buildings and erections thereon	48,900	13	4		
				£101,775 13 4	
5,961 sq. yds. ground, being area of Bellgrove Street properties, at 30s.	£8,941	10	0		
Cost of wall	1,690	6	3		
				10,631 16 3	
				£112,407 9 7	
Deduct capitalised value of feu-duties and ground-annuals, amounting to £234 7s. 10d.,				4,687 16 8	
					£107,719 12 11
HORSE BAZAAR—					
980 sq. yds. ground, at 30s.				£1,470 0 0	
Buildings and erections thereon				1,759 12 6	
					3,229 12 6

*The proceeds are handed to the fleshers, each one making a bargain for himself.

†Such as the apparatus described on page 351.

BANK OFFICES IN CATTLE MARKET—			
248 sq. yds. ground, at 30s.		£372 0 0	
Erections thereon..		796 16 7	
			1,168 16 7
DEAD MEAT MARKET—			
3,689 sq. yds. ground, at 30s...	£5,533 10 0		
557⅔ sq. yds. 10-16, Moore Street	835 16 8		
		£6,369 6 8	
Buildings and fittings at last balance	£20,005 7 2		
Add—Further payments on account of extension.. ..	950 0 0		
		20,955 7 2	
		£27,324 13 10	
Deduct capitalised value of feu-duty of £2 10s. 10d.		50 16 8	
			27,273 17 2
TENEMENT, 10-16, MOORE STREET (demolished for extension of Meat Market).			
MOORE STREET SLAUGHTERHOUSE—			
13,695 sq. yds. ground, at 30s.		£20,542 10 0	
Value of portion of old buildings still in use (one-half) ..	£10,310 15 5		
Sum expended on reconstruction, as at last balance ..	17,980 13 4		
Further payments	4,501 2 4		
		32,792 12 1	
		£53,335 2 1	
Deduct capitalised value of feu-duty of £82 3s. 2d.		1,643 3 4	
			51,691 18 9
MILTON SLAUGHTERHOUSE—			
2,968 sq. yds. ground, at 25s.		£3,710 0 0	
Buildings, etc., thereon		3,406 8 0	
		£7,116 8 0	
Deduct capitalised value of feu-duties of £68 4s. 8d.		1,364 13 4	
			5,751 14 8
VICTORIA STREET SLAUGHTERHOUSE—			
4,260 sq. yds. ground, at 30s.		£6,390 0 0	
Buildings, etc., thereon		6,349 5 7	
		£12,739 5 7	
Deduct capitalised value of feu-duties of £78 11s. 9d.		1,571 15 0	
			11,167 10 7

PROPERTY IN VICTORIA AND RITCHIE STREETS—			
296 sq. yds. ground and buildings, occupied as shops and dwelling-houses	£3,806 0 0		
Deduct capitalised value of feu-duty of £14 9s. 2d.	325 6 3		
		3,480 13	9
FISH MARKET, EAST CLYDE STREET—			
Ground and buildings	£41,326 10 8		
Deduct capitalised value of feu-duty of £66 11s. 3d.	1,331 5 0		
		39,995 5	8
GUILDRY COURT AND MERCHANT LANE PROPERTY—			
Ground and buildings, consisting of shops, dwelling-houses, etc.	£15,120 0 0		
Deduct capitalised value of feu-duty of £163 8s. 9d	3,268 15 0		
		11,851 5	0
II. MOVABLE PROPERTY.			
Machinery, furniture, fittings, and utensils in markets, slaughterhouses, inn, etc., as at last balance	£1,548 4 1		
Add cost of new vertical steam boiler fitted up at Moore Street, etc.	136 3 9		
		1,684 7	10
III. OPEN ACCOUNTS.			
Searching-houses, for sum at debit	£168 7 4		
Rents and dues outstanding on 31st May (since received)	592 16 5		
Corporation (general department)	1,500 0 0		
		2,261 3	9
IV. BANK ACCOUNT.			
Royal Bank, trustees' account		1,213 9	4
		£268,489 8	6

BYELAWS FOR THE REGULATION OF THE GLASGOW CATTLE MARKET, 1887.

The Lord Provost, Magistrates, and Council of the City of Glasgow, as Commissioners under "The Glasgow Markets and Slaughterhouses Acts, 1865, 1871, 1877, and 1884," hereby make and enact the following byelaws for the management and regulation of the Glasgow Cattle Market, established in virtue of the said Acts, and ordain the same to be strictly observed and enforced under the penalties therein expressed.

I.—The expressions "the Commissioners," "the Superintendent," and "the Lessee" shall, in these byelaws, mean respectively the "Lord Provost, Magistrates, and Council of the City of Glasgow, as Commissioners under the Glasgow Markets and Slaughterhouses Acts, 1865, 1871, 1877, and 1884," "the Superintendent of said Commissioners," and "the Lessee of the Cattle Market."

II.—The ordinary weekly market for the sale and purchase of live cattle, sheep, horses, pigs, etc., will be held every Wednesday, but the market will also, subject to the provisions of Byelaw No. V., be open every other lawful day for the sale and purchase of such animals as it may not be convenient to sell on Wednesdays.

III.—The gates of the market will be open for the reception and penning or tying-up of stock at such hours as the Commissioners may from time to time determine. From the end of February till the end of October sales shall commence at seven o'clock a.m., and end at five o'clock p.m. From the beginning of November till the end of February, sales shall commence at eight o'clock a.m., and end at five o'clock p.m. No sales or purchases shall be made before the hour fixed, as above, for the commencement of sales, nor shall any stock be handled on any pretence whatever before such hour, except by the exposer. No sales or purchases shall be made after five o'clock p.m. A bell shall be rung by the lessee on Wednesdays at the hour fixed for the commencement of sales, as above, and also at five o'clock p.m. on Wednesdays.

IV.—Except as mentioned in Byelaw No. III., no person shall ring a bell or make any other noise in the market for the purpose of calling the attention of the people therein to any sale then going on, or about to commence.

V.—The Commissioners shall be entitled to close the market on public holidays, and on such other day or days as they may so resolve, on giving fourteen days' previous notice of such resolution by placard posted up in the market.

VI.—No person shall enter the market except on business, and no person shall stand or loiter at or about the entrance gates.

VII.—No gambling, swearing, or profane, obscene, or abusive language shall be allowed in the market.

VIII.—Immediately after five o'clock p.m. exposers and purchasers shall be bound to remove their stock from the market, or they may, by previous arrangement with the lessee, store their stock with him in the market, and for such storage, including food, he shall be entitled to charge at such rates as may, from time to time, be approved by the Commissioners.

IX.—All parties shall leave the market as soon as possible after five o'clock p.m., and no person shall remain in the market after being required to leave the same by the superintendent, the lessee, or any constable of police.

X.—All dues shall be paid on the stock entering the market.

XI.—Every cattle beast shall, on entering the market, be tied up by the owner, or party in charge thereof, as and where directed by the lessee, but subject to the control of the superintendent. No person shall be allowed to occupy, with such animals, more space than necessary.

XII.—Calves, sheep, lambs, and pigs, shall, on entering the market, be put in pens by the owner or party in charge thereof, as and where directed by the lessee, but subject to the control of the superintendent. No person shall be allowed to occupy with such animals more pens than are necessary.

XIII.—No animals, except horses, shall be unbound or unpenned, unless for the purpose of being removed from the market.

XIV.—Bulls, and all dangerous animals, shall be led to, from, and in the market by a chain or rope of sufficient strength attached to them, and they shall be tied up, by such chain or rope, as directed by Byelaw No. xi., and shall be attended by the person, or persons, in charge thereof.

XV.—Every person taking any cattle, or other animal, into the market, shall, on entering, give to the lessee, or person in charge of the entrance, a correct account of the number and description thereof, and the name of the owner thereof, and shall afterwards, on request by the lessee or the superintendent, give such information in relation thereto as may be asked and he can give.

XVI.—Horses shall only be shown or run on such place, or places, as the lessee may appoint, subject, however, to the control of the superintendent. Horses, unless tied up, must be led in hand by a sufficient halter with rope or chain.

XVII.—No dog shall be allowed to go at large in the market, but must either be tied up or led in hand.

XVIII.—No person shall injure the buildings, erections, or fittings of, or in, the market and, if any injury is done to them, the lessee shall give immediate information thereof to the superintendent.

XIX.—The Commissioners shall be entitled to make such regulations as to the terms and conditions on which the sale rings in the market may be used, as they may from time to time consider necessary, expedient, and reasonable.

XX.—No person shall throw stones or any other thing into or within the market, or in any manner of way foul or improperly use or waste the water in the troughs in the market.

XXI.—No person shall act as a jobber or otherwise ply for hire in the market unless he be duly licensed for such purpose by the superintendent.

XXII.—The superintendent may grant to any person who shall produce satisfactory proof of his good character and fitness for the situation, and upon payment of two shillings and sixpence by the applicant, a license to act as a jobber, or otherwise to ply for hire in the market; and every such license shall specify the number thereof, and the name, place of abode, and age of the person to whom it is granted. Every license shall bear the date on which it is granted, and shall continue in force until the thirty-first day of May then next, unless it shall be sooner revoked or suspended by the superintendent, which he shall be entitled at any time to do without assigning a reason therefor.

XXIII.—The superintendent may, during one calendar month preceding the thirty-first day of May in every year, renew such licenses (free of expense) to take effect from the date thereof, and to continue in force (except as aforesaid) until the thirty-first day of May in the then following year.

XXIV.—The superintendent shall cause the particulars of every license to be registered in a book at his office, which book shall be open to inspection by parties interested at all reasonable times without payment of any fee.

XXV.—The superintendent shall, along with each license, deliver to the person to whom the same shall be granted, a metal badge showing the description and number of the license.

XXVI.—Every person holding a license shall, at all times when in the market, wear his badge conspicuously on the upper and outer part of the left arm, in such manner that the same shall be distinctly visible. He shall also be bound to produce his license for inspection, when required, to the superintendent, or to any police constable on duty.

XXVII.—Whenever any person holding a license shall change his place of abode he shall, within seven days, give notice thereof in writing, signed by him, to the superintendent, specifying his new place of abode, and shall produce his license to the superintendent, who shall indorse thereon and register in the said book the particulars of such change of residence.

XXVIII.—Upon the expiration, revocation, or suspension of any license, the person to whom the same shall have been granted, shall, within one week, deliver up his license and badge to the superintendent, and shall not, after the expiration or revocation of such license, or during the time of its suspension, use or wear the badge relating thereto.

XXIX.—No person to whom a license or badge shall have been granted shall transfer or lend his license, or permit or suffer any other person to use or wear his badge.

XXX.—The superintendent, lessee, or officers of police shall be entitled to enforce these byelaws, and it shall be the duty of the superintendent to enforce them as well against the lessee as against the parties attending the market.

XXXI.—Every person contravening or failing to observe the foregoing byelaws shall, for each offence, and in addition to any other remedy legally competent, be liable to a penalty not exceeding five pounds.

XXXII.—From and after the expiry of one month from the date when these byelaws are approved by the Secretary for Scotland, the byelaws now in force at the market shall be, and are hereby repealed, reserving, however, the effect of anything done prior to that time under said last-mentioned byelaws.

Signed by me, Lord Provost of the City of Glasgow, and Chairman of the Commissioners under "The Glasgow Markets and Slaughterhouses Acts, 1865, 1871, 1877, and 1884," in name and by appointment of the Commissioners, and also by two of the said Commissioners, in terms of the Statute.—JAMES KING, *Lord Provost*; JAMES M'FARLANE, *Commissioner*; WM. STEVENSON, *Commissioner*.

21st July, 1887.

GLASGOW, 10th October, 1887.—Allows and confirms the foregoing byelaws.—ROBERT BERRY, *Sheriff of Lanarkshire*.

DOVER HOUSE, WHITEHALL, 21st October, 1887.—I hereby approve the foregoing byelaws for the regulation of the Glasgow Cattle Market, dated the 21st July, 1887.—LOTHIAN, *Her Majesty's Secretary for Scotland*

Seal of Secretary for Scotland.

ADDITIONAL BYELAWS. GLASGOW CATTLE MARKET. FOR THE REGULATION OF AUCTION SALES.

(22nd Nov., 1900.)

I.—No sales by auction shall be held in the cattle market except on conditions of sale, which shall be equally applicable to bidders and buyers. The market shall not be used for auction sales open only to any limited number of persons, or for auction sales in which any class of the public is excluded from bidding or buying.

II.—Every person who contravenes or fails to observe the foregoing byelaw shall, for each breach of the law, be liable to a penalty not exceeding five pounds.

NOTE.—The above byelaws became necessary in consequence of the attempted exclusion by the butchers' association of buyers from the co-operative societies.

BYELAWS FOR THE REGULATION OF THE GLASGOW SLAUGHTERHOUSES.

I.—The slaughterhouses shall be open for work every lawful day from six o'clock in the morning till eight o'clock in the evening, from 1st April till 1st October, and from six o'clock in the morning till seven o'clock in the evening, from 1st October till 1st April. On Saturdays the slaughterhouses will be closed at five o'clock afternoon. During June, July, and August, attendance will be given on Saturdays till eight o'clock. The gates shall be kept shut except when required to be open for business purposes,

II.—No person shall be admitted within the gates at any time except on business. No dogs shall be admitted except sheep-dogs. No drunk person shall be admitted at any time.

III.—Persons desiring to be admitted during other than the working hours above specified must apply to the superintendent, and shall not enter without his special permission.

IV.—Persons having cattle, sheep, or pigs to feed on Sundays, shall be admitted for that purpose between nine and ten o'clock in the morning, and between four and five o'clock in the afternoon.

V.—The searching-house shall be open for receiving tallow from seven o'clock in the morning till six o'clock in the evening all the year round, except on Saturdays, when the same shall be closed at five o'clock afternoon.

VI.—No person shall take spirits or other intoxicating liquor within the gates of the slaughterhouses.

VII.—The gatekeeper shall be at liberty to search all male persons leaving the slaughterhouses whom be may suspect of improperly carrying off property, and he shall also be at liberty to search all bundles, packages, or things in which he may suspect such property to be concealed. Females shall be searched by a female appointed by the superintendent to do so.

VIII.—Cattle, sheep, pigs, and other animals of whatsoever kind admitted to the slaughterhouses. shall, on admission, be correctly reported to the gatekeeper.

IX.—When any animal so admitted appears to the gatekeeper to be diseased, he shall report the matter to the superintendent, who may order the animal or the carcase to be kept apart until it has been inspected by competent judges. All condemned meat shall be retained by the superintendent.

X.—Bulls, and all other unruly animals, shall be kept in the byres, and bound to the stakes or ring in the walls.

XI.—Every person who, without the authority of the owner, or the superintendent, shall interfere with cattle or sheep in the byres or pens, by loosing the cattle from the stakes, or shifting the sheep from the pens, or otherwise causing trouble and annoyance to the owners, shall be guilty of an offence, and on conviction shall be liable to a penalty.

XII.—Every person engaged in the slaughterhouses shall be careful to prevent waste of water or gas, and to secure cleanliness.

XIII.—Ever person renting a room or lairs for keeping cattle and sheep, shall keep the same thoroughly clean at the sight and to the satisfaction of the superintendent.

XIV.—Every person engaged in killing or dressing sheep, lambs, or pigs shall empty the contents of the entrails of such animals into barrows, and prevent any portion thereof from falling upon the floors or passages.

XV.—No sheep, lamb, pig, or other animal shall be slaughtered or dressed in any of the passages, but only in the rooms or sheds set apart for the purpose.

XVI.—Rooms and other places occupied by dealers in blood and offal shall be washed and cleaned once every twenty-four hours, and the superintendent shall be entitled at all times to order such further cleaning as he may consider necessary.

XVII.—When the work of each flesher or other person engaged in any work in the slaughterhouses is finished he shall remove all blood, offal, or refuse, and sweep and wash the floor of the room or shed he has occupied, extinguish the gas therein, where the gas has been lighted, and leave all the refuse outside in the passage.

XVIII.—Blood barrels shall be kept in such way and manner as may be directed by the superintendent, and all blood collected in the slaughterhouses shall be removed within twenty-four hours after it has been collected. No blood or benefit shall be sold within the gates. Persons dealing in blood must pay for such accommodation as they may require, and as may be assigned to them by the superintendent.

XIX.—All barrows and coaches shall have the name of the owner painted on them, and shall be kept clean, and in such places as the superintendent may direct, when not required for immediate use.

XX.—The superintendent shall, twice every day, examine the whole premises to check waste of water or gas, and to secure cleanliness and strict order, and shall report every violation of these byelaws, and the names of the offenders.

XXI.—Every carcase shall be removed as soon as possible after it is dressed, and in the event of its being kept in the slaughterhouse for the purpose of being sold, it shall be removed to the meat market, and be subject to such charge for accommodation there as may be fixed by the commissioners from time to time. If sold in the slaughterhouses a charge will be exigible similar to that in the meat market.

XXII —All dues and charges of every kind due by any person shall, if required by the superintendent or clerk, be paid before any carcase or part of a carcase, or other property belonging to the person by whom such dues and charges are due, shall be removed from the slaughterhouses.

XXIII.—All cattle, sheep, pigs, and other animals of every description, which may be brought into the slaughterhouses and afterwards be sold, shall be liable to a charge per head, to be fixed by the commissioners from time to time, and no such animals shall be removed from the slaughterhouses until such charges in respect thereof shall have been paid.

XXIV.—The superintendent shall have power from time to time to prescribe the gate by which alone all animals, carcases, and other articles or things shall be removed from the slaughterhouses; and no person shall remove any animal, carcase, or other article or thing from the slaughterhouses without a pass from the superintendent or his clerk, and except by the gate so prescribed. Every person violating this regulation may be detained by the superintendent, or any of his assistants, and handed over to the police.

XXV.—No person shall remove from the slaughterhouses any animal, or carcase, or part of a carcase, or any other article or thing, without previously reporting and, if required, exhibiting the same to the superintendent, or the clerk on duty in the office, and obtaining from him a pass, which shall bear on it a number corresponding to that in the register of animals or articles removed; and which pass shall be handed to the gatekeeper before the bearer is permitted to pass through.

XXVI.—No carcase, nor part of a carcase, shall be removed from the slaughterhouses without being properly covered with a clean and suitable covering; and no person shall sit on any portion of a carcase, or part of a carcase, within the slaughterhouses, or in course of removal, nor on any covering.

XXVII.—No person shall kill any animal in the slaughterhouses without a license from the superintendent, which shall be granted subject to such regulations, in regard to the mode in which animals are to be slaughtered, as the commissioners may from time to time make. Every person who kills any animal in the slaughterhouses without such license, or who contravenes the regulations in force at the time, shall be immediately reported for prosecution, and the superintendent may at any time withdraw any license so granted without assigning a reason for such withdrawal.

XXVIII.—The superintendent, or his assistant, shall prevent summarily any unnecessary suffering in slaughtering or any cruelty to animals in the slaughterhouses, and shall report for prosecution the names of every person guilty of such cruelty.

XXIX.—The more effectually to prevent unnecessary suffering or cruelty to animals in the slaughterhouses, the commissioners may grant authority by an order signed by the town clerk, to any person or persons to enter the slaughterhouses during business hours, and to see the mode in which the animals are killed. But such person or persons shall not interfere in any way with the killers or other persons engaged in the slaughtering or dressing of animals. They may, however, either report to the superintendent any case of cruelty or contravention of the regulations of the commissioners that may fall under their observation, leaving him to deal therewith as may seem proper, or they may proceed against the offender under any Act in force for the time for the prevention of cruelty to animals.

XXX.—The superintendent may from time to time grant licenses to a sufficient number of operatives, assistants, jobbers, and coach drawers, and fix the rate of their remuneration; and he shall also have power to withdraw at any time each license so granted without assigning a reason for so doing.

XXXI.—Each person holding a license from the superintendent under these byelaws, except master fleshers or their servants killing their own animals, shall wear a distinctive badge, to be provided by the superintendent, and supplied along with the license upon payment of two shillings and sixpence, which sum will be returned upon the badge being redelivered to the superintendent.

XXXII.—No flesher shall employ any person who is not so provided with a badge to do any work for him within the slaughterhouses except his own servants. Every person holding a license, except killers exclusively retained by fleshers for their own service, shall accept employment when offered to him, if he be not otherwise engaged, and in the event of his refusal to work, his license shall be withdrawn, and he shall be summarily removed from the slaughterhouses.

XXXIII.—Every person holding such license shall be bound to obey the directions of the superintendent, and in the event of his failing or delaying to obey such directions, the superintendent may summarily cancel the license of the person so offending, and remove him from the slaughterhouses.

XXXIV.—The feet, tripe, and offal of all cattle shall be prepared for the market in the tripery, or washed in such a place as may be set apart for that purpose, at such rates as may be fixed by the commissioners from time to time. No gut or other entrails shall be allowed to be cleaned within the gates of the slaughterhouses, but shall be removed immediately after the same has been collected, so that at no time shall any gut or other entrails remain in the slaughterhouses overnight.

XXXV.—The fleshers shall be responsible for the conduct of all persons employed by them, and for whatever damage may be done to property by the persons so employed, other than ordinary tear and wear.

XXXVI.—Whenever the number of animals brought into the slaughterhouses for the purpose of being killed is so great as to occasion delay and inconvenience or loss, the superintendent shall have power to regulate the order in which the killing shall proceed, so as to cause the least possible inconvenience and loss to the persons to whom the animals belong, and every person interested, and all the workers in the slaughterhouses shall be bound to aid the superintendent in carrying out such arrangements as the superintendent may find it expedient to make.

XXXVII.—All disputes in regard to the occupation of rooms or pens shall be determined by the superintendent, and every person delaying or refusing to give effect to such determination shall be removed from the slaughterhouses.

XXXVIII.—The superintendent shall regulate from time to time, as he may consider necessary, the rate of speed at which horses and vehicles shall pass in and out of the slaughterhouses, or drive within the gates, and also assign such horses and vehicles their place in the slaughterhouses. And every person who shall refuse or delay to conform to the orders of the superintendent, so given, shall be summarily removed from the slaughterhouses, and reported for prosecution.

XXXIX.—In the absence of the superintendent, the clerk at the gate, or the gatekeeper, shall have all the powers conferred, and shall perform all the duties imposed on the superintendent.

XL.—Every person who interferes with or obstructs the superintendent, or any of his assistants, in the execution of his duty, or who refuses or delays to give effect to these byelaws, or who causes any disturbance in the slaughterhouses, shall be summarily removed therefrom, and reported for prosecution.

XLI.—Every police officer shall aid the superintendent and his assistants in the execution of these byelaws.

XLII.—The foregoing byelaws shall be strictly enforced, and any person not complying with Sections 3, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 36, 38, and 40 thereof respectively, shall be subject to a penalty not exceeding forty shillings for each offence, to be levied, recovered, and applied in terms of the Act of Parliament.

XLIII.—All previous byelaws for the regulation of the Glasgow slaughterhouses are hereby repealed.

ADDITIONAL BYELAW FOR THE REGULATION OF THE GLASGOW SLAUGHTERHOUSES.

No gut shall be allowed to be cleaned within the gates of the slaughterhouses except in such part or parts thereof, if any, as may from time to time, with the consent of the local authority under the Public Health (Scotland) Act, 1867, be specially set apart by the Commissioners for that purpose; and such cleaning shall be allowed on such terms and carried on in conformity with such regulations as may from time to time be made by the Commissioners, and posted up in the place or places where such cleaning is allowed. Such regulations shall not be held to free anyone from any liability to a penalty or otherwise for creating any nuisance under the Public Health (Scotland) Act, 1867, or other Act. Every person contravening this byelaw by cleaning gut in any part of the slaughterhouses not set aside for the purpose of cleaning gut, or contravening any regulations made and posted up as aforesaid, shall, for each offence, be subject to a penalty not exceeding forty shillings. In so far as the thirty-fourth of the byelaws, dated 7th October, 1875, for the regulation of the Glasgow slaughterhouses, provides that no gut shall be allowed to be cleaned within the gates of the slaughterhouses, but shall be removed immediately after the same has been collected, so that at no time shall any gut remain in the slaughterhouses overnight, the said byelaw is hereby repealed.

ADDITIONAL BYELAW FOR THE REGULATION OF THE GLASGOW SLAUGHTERHOUSES.

All oxen, cows, bulls, calves, heifers, sheep, lambs, swine, or goats entering any of the slaughterhouses shall, except with the written permission of the Committee of Management of the Commissioners under the Glasgow Markets and Slaughterhouses Acts, or of their superintendent of markets and slaughterhouses, be slaughtered within a period of one hundred and twenty hours from the time of admission, and that under a penalty not exceeding five pounds for each animal not so slaughtered for the first period of twenty-four hours or part thereof after the expiry of said one hundred and twenty hours, and the like penalty for each succeeding period of twenty-four hours or part thereof, during which each of such animals shall remain not slaughtered as aforesaid; but in the event of disease being discovered in any of the animals in any of the slaughterhouses, or of any of the slaughterhouses being declared an infected place under the Contagious Diseases (Animals) Acts, the said Commissioners, or their Committee of Management, in order to admit of the cleansing and disinfection of such slaughterhouse, may, by notice to the owner or party in charge of such animals, order the animals to be slaughtered within such less time as they may, in the circumstances, consider expedient, and that under a penalty not exceeding five pounds for each animal not so slaughtered for the first period of twenty-four hours or part thereof after the time of such notice being given, and the like penalty for each succeeding period of twenty-four hours or part thereof during which each of such animals shall remain not slaughtered as aforesaid.

ADDITIONAL BYELAW FOR THE REGULATION OF THE GLASGOW SLAUGHTERHOUSES.

(25th July, 1892.)

Made and enacted by the Lord Provost, Magistrates, and Council of the City of Glasgow, Commissioners acting under "The Glasgow Markets and Slaughterhouses Acts, 1865, 1871, 1877, and 1884."

All oxen, cows, bulls, calves, heifers, sheep, lambs, swine, or goats, entering any of the slaughterhouses shall, except with the written permission of the Committee of Management of the Commissioners under the Glasgow Markets and Slaughterhouses Acts, or of the superintendent of markets and slaughterhouses, be slaughtered within a period of one hundred and twenty hours from the time of admission, and that under a penalty not exceeding five pounds for each animal not so slaughtered for the first period of twenty-four hours or part thereof after the expiry of said one hundred and twenty hours, and the like penalty for each succeeding period of twenty-four hours or part thereof, during which each of such animals shall remain not slaughtered as aforesaid; but in the event of disease being discovered in any of the animals in any of the slaughterhouses, or of any of the slaughterhouses being declared an infected place under the Contagious Diseases (Animals) Acts, the said Commissioners, or their Committee of Management, in order to admit of the cleansing and disinfection of such slaughterhouse may, by notice to the owner or party in charge of such animals, order the animals to be slaughtered within such less time as they may, in the circumstances, consider expedient, and that under a penalty not exceeding five pounds for each animal not so slaughtered for the first period of twenty-four hours or part thereof after the time of such notice being given, and the like penalty for each succeeding period of twenty-four hours or part thereof during which each of such animals shall remain not slaughtered as aforesaid.

Signed in name and by appointment of said Commissioners, by the Honourable John Muir, Lord Provost of the City of Glasgow, their chairman; and also by William Stevenson and James Henderson Martin, two of the said Commissioners, in terms of the Markets and Fairs Clauses Act, 1847, this 16th day of June, 1892. JOHN MUIR, *Lord Provost;* WM. STEVENSON, *Commissioner;* J. H. MARTIN, *Commissioner.*

Approves of the above byelaw.

ROBERT BERRY, *Sheriff of Lanarkshire.*

Sheriff's Chambers, Glasgow, 25th July, 1892.

In terms of the Markets and Fairs Clauses Act, 1847, Sec. 44, and of the Secretary for Scotland Acts, 1885 to 1889, I, the Most Honourable Schomberg Henry, Marquess and Earl of Lothian, K.T., Her Majesty's Secretary for Scotland, hereby approve the foregoing bye-law.

LOTHIAN.

L.S.

Office of the Secretary for Scotland.
Whitehall, 11th August, 1892.

BYELAWS FOR THE GLASGOW DEAD MEAT MARKET.

(December, 1879.)

I.—No person shall be admitted into the market except on business.

II.—No person shall stand at, or loiter about, the entrances to the market.

III.—No person, except stanceholders and their servants, shall remain in the market after the closing of the gates, and the superintendent shall have power from time to time to fix the time by which stanceholders and their servants must have left the market. No dogs shall be admitted. No drunk person shall be admitted. Every person, except stanceholders and their servants, who fails to leave the market at the hour of closing shall for each offence be liable to a penalty not exceeding twenty shillings.

IV.—No person shall take spirits or any other intoxicating liquors into the market.

V.—No person, except stanceholders and their servants, shall sell any meat in the market.

VI.—Persons contravening Byelaws Nos. II., IV., or V., shall for each offence be liable to a penalty not exceeding forty shillings.

VII.—Applications for stances must be made to the superintendent at his office in the market, and stances shall be let by the week. The rent of such stances shall be payable in advance, and the commissioners shall be entitled to resume possession of any stance on giving the tenant three days' notice before the expiry of any weekly let. Such notice may be given by the superintendent or other officer of the commissioners duly authorised by them.

VIII.—No unsound or unwholesome meat shall be brought into the market.

IX.—Each stanceholder must keep within his stance, and shall on no pretence place or allow any hamper, package, or other article or thing belonging to him to project beyond the limits thereof. No stanceholder shall attempt, beyond the limits of his stance, to induce any person to make purchases.

X.—Every stanceholder shall sweep out and thoroughly cleanse his stance daily to the satisfaction of the superintendent.

XI.—Every person who shall knowingly attempt to bring any meat into the market without having previously paid all sums exigible by the commissioners in respect thereof, or who shall in any manner attempt to evade payment of any moneys due to or exigible by the commissioners, shall for every such offence be liable to a penalty not exceeding forty shillings over and above the sums due or exigible as aforesaid.

XII.—If meat on a van, cart, or other vehicle is weighed at the weighing machine of the commissioners, the driver or other person in charge of the vehicle shall, within two hours, return it empty to the weighing machine for the purpose of ascertaining the tare, and if he refuse or neglect so to return it, he shall for every offence be liable to a penalty not exceeding twenty shillings.

XIII.—No person shall act as a porter, jobber, or coachdriver, or otherwise ply for hire in the market unless he be duly licensed for such purpose by the superintendent of the market. Every person contravening this byelaw shall for each offence be liable to a penalty not exceeding twenty shillings.

XIV.—The superintendent of the market may, upon payment of two shillings and sixpence, grant to any person who shall produce satisfactory proof of his good character and fitness for the situation, a license to act as porter, jobber, or coachdriver in the market, and every such license shall specify the number thereof, and the name, place of abode, and age of the person to whom it is granted. Every license shall bear the date on which it is granted, and shall continue in force until the Thirty-first day of May then next, unless it shall be sooner revoked by the superintendent of the market, which he shall be entitled at any time to do, without assigning a reason therefor.

XV.—The superintendent of the market may, during one calendar month preceding the Thirty-first day of May in every year, renew such licenses (free of expense) to take effect from the date thereof, and to continue in force (except as aforesaid) until the Thirty-first day of May in the then following year.

XVI.—The superintendent of the market shall cause the particulars of every license to be registered in a book at the market, which book shall be open to inspection by parties interested at all reasonable times without payment of any fee.

XVII.—The superintendent of the market shall, along with each license, deliver to the person to whom the same shall be granted, a metal badge showing the description and number of the license.

XVIII.—Every person holding a license shall, at all times when in the market or engaged at his particular work, wear his badge conspicuously on the upper and outer part of the left arm, in such manner that the same shall be distinctly visible. He shall also be bound to produce his license for inspection, when required, to the superintendent or to any police constable on duty. For every contravention of this byelaw the offender shall be liable to a penalty not exceeding forty shillings.

XIX.—Whenever any person holding a license shall change his place of abode he shall, within seven days, give notice thereof in writing, signed by him, to the superintendent of the market, specifying his new place of abode, and shall produce his license to the superintendent, who shall indorse thereon and register in the said book the particulars of such change of residence; and if any licensed person shall change his place of abode and omit to give notice thereof, as aforesaid, he shall for each offence be liable to a penalty not exceeding twenty shillings.

XX.—Upon the expiration, revocation, or suspension of any license, the person, to whom the same shall have been granted, shall within one week deliver up his license and badge to the superintendent of the market; and if after the expiration or revocation of such license, or during the time of its suspension, the person to whom the same shall have been granted shall use or wear the badge relating thereto, or shall not within one week deliver up the license and badge, every person so offending shall for each offence be liable to a penalty not exceeding twenty shillings.

XXI.—If any person to whom a license or badge shall have been granted shall transfer or lend his license, or permit or suffer any other person to use or wear his badge, the person so offending shall for every offence be liable to a penalty not exceeding forty shillings.

XXII.—No person shall swear or use profane or obscene language within the market. Every person contravening this byelaw shall for each offence be liable to a penalty not exceeding forty shillings, and may also be summarily removed from the market by the superintendent or any officer of the commissioners, or by any constable on duty.

XXIII.—Coachdrivers or others in charge of ponies must take the stances allotted to them by the superintendent, and shall take their turn when they come to the stance, and accept whatever hire they are called to, under a penalty not exceeding twenty shillings for every offence.

XXIV.—No person shall keep any lorry, coach, barrow, or other machine standing in any of the passages in the market longer than is absolutely necessary for the loading or unloading thereof, and every person contravening this byelaw shall for each offence be liable to a penalty not exceeding twenty shillings.

XXV.—All persons frequenting the market shall obey the reasonable directions of the superintendent, and every person refusing to do so, or who shall wilfully cause any obstruction in the market, shall for every offence be liable to a penalty not exceeding twenty shillings.

TABLE OF RENTS AND TOLLS PAYABLE AT THE GLASGOW DEAD MEAT MARKET (JULY, 1890).

1. Rents.

	Per week.
For each superficial foot contained in each stance	¼d.

2. Tolls on Meat.

For each ox, cow, bull, or heifer	6d.
,, sheep	1d.
,, lamb	1d.
,, stirk calf	1d.
,, fed calf	3d.
,, pig	2d.

Note.—The reduction of the toll on pigs from 3d. to 2d. each does not apply to pigs which the commissioner may, under the slaughterhouse byelaws, allow to be sold in the slaughterhouses. The charge for these will continue to be 3d. each.

3. Tolls for Weighing.

For any quantity not exceeding 1 cwt., weighed at the owner's request	½d.
And for every additional hundredweight or part of a hundredweight	½d.

Slaughterhouse Books.

The various slaughterhouse books are interesting as showing what by long experience has been found necessary in the conduct of a large market and abattoirs.

The principal books are three in number :

1. The lairage book.
2. The abattoir book.
3. The dead meat markets book.

These really embrace the whole business carried on.

(LAIRAGE BOOK.)

CATTLE MARKET.

No.....

GLASGOW,.....190

ROBERT WALKER, Superintendent, 76, Moore Street.

M .....

Folio .....

To THE CORPORATION OF GLASGOW—MARKETS DEPARTMENT.

DATE.	LAIRAGE AND STABLING.								FEEDING AND ATTENDING.								AMOUNT.		
	Cattle.		Calves.	Sheep and Lambs.	Goats.	Swine.	Horses, Mules, and Asses.		Cattle.		Calves.	Sheep and Lambs	Goats.	Swine.	Horses, Mules and Asses.		£.	s.	d.
	6d.	3d.	2d.	½d.	½d.	2d.	1s.	6d.	1/6	1/-	6d.	1½d.	2d.	6d.	3s.				

(ABATTOIR BOOK.)

No.....

GLASGOW.....190

ROBERT WALKER, Superintendent, 76 Moore Street.

M.....

Folio.....

To THE CORPORATION OF GLASGOW—MARKETS DEPT.

Date.	Slaughtering.					Weighing Hides.	Weighing.		Amount.		
	Ox, Cow, or Bull.	Calf.	Sheep.	Lamb.	Sow or Pig.				£	s.	d.
	9d.	1½d.	1½d.	¾d.	1/-	1d.	2d.				

Received Payment,

(DEAD MEAT MARKET BOOK.)

DEAD MEAT MARKET, MOORE STREET.

No.....

GLASGOW..... 19.....

ROBT. WALKER, Superintendent, 76, Moore Street.

M.....

Folio..... .....

To THE CORPORATION OF GLASGOW—MARKETS DEPT.

Date.	Exposed for Sale.						Weighing.						Amount.		
	Ox, Cow, or Bull.	Fed Calf.	Slink Calf.	Sheep	Lamb	Pig.	For any quantity not exceeding One Hundredweight .... One Halfpenny..... .....and for every additional Hundredweight or part of a Hundredweight ....One Halfpenny.								
1	6d.	3d.	1d.	1d.	1d.	2d.	Ox, Cow or Bull.	Calf.	Sheep	Lamb	Pig.	Broken Weights	£	s	d.
....	.....	.....	.....	.....	.....	.....	.....	....	.....	....	.....	.....	....	...	....
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Weekly Rent of Stance , No..... in advance.

Received Payment,

FOREIGN ANIMALS WHARF, GLASGOW.

Acting under "The Contagious Diseases (Animals) Act, 1878," the Corporation of Glasgow, as local authority, in 1879 erected the first, and still the only, foreign animals wharf in Scotland. The capacity of the wharf was 120 head of cattle, with slaughtering accommodation. From time to time alterations and additions were made, till now there is a fine range of up-to-date buildings, which cover 23,596 square yards of ground. The total cost was over £80,000 sterling, and there is accommodation for 4,000 head of cattle and 3,000

Fig. VIII. Mr. J. R. ADAMS, Superintendent.
Foreign Animals Wharf, Glasgow.

sheep, with killing rooms—hall arrangement—blood rooms, cooling and chilling rooms, etc. The present buildings were erected in 1886 and 1893, all former erections being removed. The reception lairs are a separate building, and when the stock has been inspected there, the cattle are passed on to the "sale lairage," top and mid floors. Fig. IX. shows the gangway from the ground to the mid floor; fig. X. cattle passing up from the mid to the top floor, at the further end of the building. When cattle are sold they are passed

down to the ground floor, and there taken possession of by the slaughter men. This lairage is a fireproof building, and can accommodate 2,500 head of cattle.

Fig. XI. shows the cooling room ; to the right is the chill rooms, and to the left a range of slaughter rooms. Sixty head of cattle can be in the hands of the slaughter men at one time. There is a range of cattle pens behind the slaughter rooms for cattle before being killed.

Fig. IX. FOREIGN ANIMALS WHARF, GLASGOW.
Gangway from the ground to the mid-floor.

Landing places for the reception of foreign stock "not subject to slaughter" have also been erected by the Corporation as local authority. The present place at Shieldhall cost £27,000 sterling, and can accommodate 2,000 head of cattle and a large number of sheep. Owing to this class of stock being prohibited by the Board

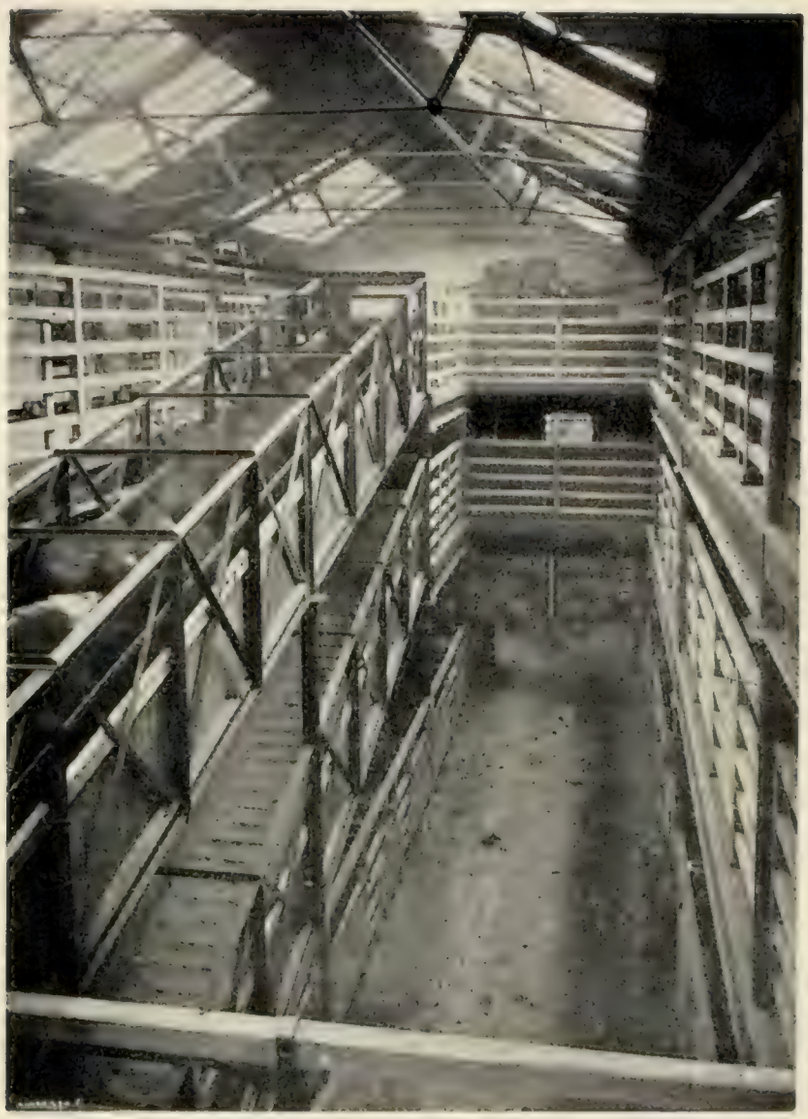


Fig. X. FOREIGN ANIMALS WHARF, GLASGOW.
Gangway from mid to top floor

Fig. XI. FOREIGN ANIMALS WHARF, GLASGOW.
Hanging, or cooling house (on the left are the slaughter-rooms, on the right chill rooms).

of Agriculture, this place has been unoccupied for some time. Fig. XII. shows an Allan liner from the States just arrived, and which has on board 350 head of cattle.

The whole of this wharf and its various departments are under the control of Mr. J. R. Adams, superintendent.

The following are statistics of the number of cattle landed during twenty-one years, and copies of the laws which regulate the conduct of business.

Fig. XII. FOREIGN ANIMALS WHARF, GLASGOW.
Allan liner "Norwegian" with 350 cattle on board alongside the wharf.

GLASGOW.

Importation of live animals from the United States, Canada, South America, France, Spain, and Iceland, from 29th June, 1879, till 31st May, 1900.

	Cattle.	Calves.	Sheep	Pigs.
June, 1879, till May, 1880 . .	7,460 ...	4 ...	1,677 ...	407
,, ,, ,, 1881 ...	23,812 ...	19 ...	9,997 ...	546
,, ,, ,, 1882 ...	19,455 ...	23 ...	14,073 ...	—
,, ,, ,, 1883 ...	20,375 ...	12 ...	11,209 ...	—
,, ,, ,, 1884 ...	37,031 ...	42 ...	12,678 ...	—
,, ,, ,, 1885 ...	39,642 ...	18 ...	10,514 ...	73
,, ,, ,, 1886 ...	35,684 ...	38 ...	6,641 ...	—
,, ,, ,, 1887 ...	33,960 ...	34 ...	10,922 ...	—
,, ,, ,, 1888 ...	34,172 ...	9 ...	2,508 ...	—
,, ,, ,, 1889 ...	44,210 ..	44 ...	6,053 ..	—
,, ,, ,, 1890 ...	66,397 ..	50 ...	1,301 ...	—
,, ,, ,, 1891 ...	77,594 ...	187 ...	3,098 ...	—
,, ,, ,, 1892 ...	75,524 ...	180 ...	1,494 ...	—
,, ,, ,, 1893 ...	65,205 ...	17 ...	105 ...	—
,, ,, ,, 1894 ...	54,372 ...	— ...	3,905 ...	—
,, ,, ,, 1895 ...	48,024 ...	1 ...	56,484 ...	58
,, ,, ,, 1896 ...	61,139 ...	26 ...	71,371 ...	128
,, ,, ,, 1897 ...	72,797 ..	1 ...	33,566 ...	—
,, ,, ,, 1898 ...	64,068 ...	1 ...	34,715 ...	—
,, ,, ,, 1899 ...	47,493 ...	1 ..	14,082 ...	—
,, ,, ,, 1900 ...	48,421 ...	— ...	26,023 ...	—
	976,835	707	332,416	1,212

The following are the byelaws which govern the Foreign Animals Wharf, Glasgow.

BURGH OF GLASGOW.

THE DISEASES OF ANIMALS ACT, 1894.

BYELAWS FOR THE SALE RINGS IN THE FOREIGN ANIMALS WHARF AT POINTHOUSE.

The Local Authority of the City and Royal Burgh of Glasgow, acting under the Diseases of Animals Act, 1894, hereby make and enact the following byelaws for the management and regulation of the sale rings in the Foreign Animals Wharf belonging to them at Pointhouse:

I.—Sales of cattle by auction shall only be held in the rings provided for the purpose, and sales shall only be held in one ring at the same time.

II.—The time allowed to salesmen for the occupation of the ring, at any one time, shall be fixed according to the number of cattle each of them has for sale, as follows:

Not exceeding 50 cattle	15 minutes.
Exceeding 50 and not exceeding 100	20 ,,
,, 100 ,, 150	25 ,,
,, 150 ,, 200	30 ,,
,, 200 ,, 250	35 ,,
,, 250 ,, 300	40 ,,
,, 300	45 ,,

III.—The order in which salesmen shall be entitled to occupy the ring will be decided according to the number of cattle each of them has for sale—the salesman having the largest number to have the first turn, and the other salesman to follow him according to the number held by them. When salesmen have an equal number, the order of precedence shall, as between them, be decided by ballot.

IV.—Sales shall start not more than fifteen minutes after the advertised time, and any salesman not present when his time arrives, in any rotation, shall lose his turn, and shall not occupy the ring until his turn arrives in the next rotation, when he shall occupy it for his proportionate time only.

V.—Only cattle from the United States shall be sold on Mondays, and only cattle from Canada shall be sold on Tuesdays; provided always that when no cattle from the United States are in the wharf for sale on Mondays, or when no cattle from Canada are in the wharf for sale on Tuesdays, the Local Authority may give written permission either for cattle from Canada to be sold on Mondays, or for cattle from the United States to be sold on Tuesdays.

VI.—Cattle of all classes may be sold on Wednesdays, Thursdays, Fridays, and Saturdays.

VII.—Every person who contravenes or fails to observe the foregoing byelaws may be ejected from the wharf by any police constable or officer or employee of the Local Authority, and shall also, for each breach of these byelaws, be liable to a penalty not exceeding five pounds.

THE CONTAGIOUS DISEASES (ANIMALS) ACT, 1878.

BYELAWS FOR THE GLASGOW FOREIGN ANIMALS WHARF AT POINTHOUSE.

I.—All applications for the use of the premises must be made on the Local Authority's printed forms, which may be had at the office of the superintendent at the wharf. The applications must be lodged at the superintendent's office. This should be done before the arrival of the vessel bringing the animals, and must state the name of the vessel, her expected time of arrival, and the number of animals for which accommodation is desired.

II.—No person shall be admitted within the premises at any time except on business. No dogs shall be admitted. No drunk person shall be admitted.

III.—No person shall take spirits or other intoxicating liquors into the premises, and no smoking shall be allowed on any part of the premises. Every person contravening this byelaw shall for each offence be liable to a penalty not exceeding forty shillings.

IV.—Importers and owners must house their own stock, and provide them with proper halters, bedding, provender, and attendance. Should they neglect to do so, the Local Authority will make such provision as they consider necessary, and charge the importer or owner, as the case may require—with the cost thereof, the Local Authority having a lien therefor on the stock, meat and produce, with power to sell in default of immediate payment.

V.—Importers and owners must cause the immediate slaughter of any animals that may be declared by the Inspectors of the Privy Council or of the Local Authority to be diseased, and must also cause the slaughter of such animals as may be required to be slaughtered at a foreign animals wharf under the Act or any order of the Privy Council, and if they fail to do so, the Local Authority may, if they think fit, cause such animals to be destroyed and disposed of, charging the expense to the importer or owner, as the case may require, and of which expense the Local Authority shall have power to determine and fix the amount.

VI.—No person shall slaughter or dress any animal in any part of the premises except that specially set apart for the purpose, and every person contravening this byelaw shall for each offence be liable to a penalty not exceeding forty shillings.

VII.—No person shall remove any animal, carcase, or other article or thing from the premises without a pass from the superintendent. Every person violating this byelaw may be detained by the superintendent, or any of his assistants, and handed over to the police, and shall besides be liable for each offence, to a penalty not exceeding twenty shillings.

VIII.—No person shall remove any carcase, or par of a carcase, from the premises without its being properly covered with a clean and suitable covering; and no person shall sit on any carcase, or part of a carcase, within the premises, or in course of removal, nor on any covering. Every person contravening this byelaw shall for each offence be liable to a penalty not exceeding twenty shillings.

IX.—No person shall kill any animal in the slaughterhouse without a license from the superintendent, which shall be granted subject to such regulations in regard to the mode in which animals are to be slaughtered, as are herein contained, or as the Local Authority may from time to time make. Every person who kills any animal in the premises without such licence, or who contravenes the byelaws or regulations in force at the time, shall be immediately reported for prosecution, and the superintendent may at any time withdraw any licence so granted, without assigning any reason for such withdrawal.

X.—The superintendent or his assistants shall prevent summarily any unnecessary suffering in slaughtering, or any cruelty to animals, and shall report for prosecution the names of every person guilty of such cruelty.

XI.—Each person holding a licence from the superintendent under these byelaws, except master fleshers or their servants killing their own animals, shall wear a distinctive badge, to be provided by the superintendent, and supplied along with the licence, upon payment of two shillings and sixpence, which sum will be returned upon the badge being re-delivered to the superintendent.

XII.—When the number of animals brought into the premises for the purpose of being killed is so great as to occasion delay and inconvenience or loss, the superintendent shall have power to regulate the order in which the killing shall proceed, and the time and order of removal of carcases, so as to cause the least possible inconvenience and loss to the persons to whom the animals belong.

XIII.—All manure and refuse will belong to the Local Authority, who will undertake the disinfecting and removal thereof, and the cleansing and washing of the wharf, including the slaughterhouse.

XIV.—The Local Authority will not be liable for any damage caused by animals to other animals, nor for any loss or injury which may occur, under any circumstances, to animals whilst landing, or on the premises, or to carcases.

XV.—The Local Authority will have a lien on all carcases for their charges and for all moneys payable to them under these byelaws, and all charges and moneys payable to the Local Authority must be paid before the carcase, meat, or other article is removed from the premises.

XVI.—Importers and owners, and all persons employed by them, will be required to conform to the orders of the superintendent in regard to the time within which animals are to be slaughtered, the removal of carcases, and all other matters connected with the use of the premises. If any importer or owner, or person employed by them, shall fail to comply with these byelaws, or to obey the orders of the superintendent, the superintendent may take such measures as he may think requisite, and the importer or owner shall repay to the Local Authority any expense which may be incurred.

XVII.—Nothing in these byelaws will exempt those concerned from complying with the byelaws and regulations of the harbour authority, in so far as not inconsistent with these byelaws.

XVIII.—Importers and owners must comply with all the provisions of the orders of the Privy Council and carry out the instructions of the inspectors appointed by the Privy Council and the Local Authority.

XIX.—From and after the date when these byelaws are approved by Her Majesty's Most Honourable Privy Council, the byelaws dated respectively 18th August, 1879, and 6th July, 1880, and now in force at the wharf, shall be repealed.

XX.—In addition to the charges mentioned in Article 19 hereof the following charges shall be payable to the Local Authority for the use of the wharf and slaughterhouse, viz.:

WHARF.

	Up to midnight of the day after that on which the animals are landed, per head.	For each 24 hours after, or any part thereof, per head.
Oxen	3s.	6d.
Calves	6d.	2d.
Pigs	8d.	2½d.
Sheep	3d.	1d.

SLAUGHTERHOUSE.

Oxen	1s.	Pigs	6d.
Calves	8d.	Sheep	3d.

APPENDIX II.

LEEDS ABATTOIR.

The abattoir which was constructed in 1899 for Leeds is typical of what is considered necessary for the requirements of a modern city. The population of Leeds is 417,000, and the cost of the abattoir per inhabitant was 1/2½ per head. The total cost, exclusive of the land, was £25,319, and the area of land covered by buildings is 3,260 square yards.

The buildings may be classified as follows:

(1) Market hall for sale of meat, and official block.
(2) Slaughterhouses and lairages for beasts and pigs.
(3) Tripery, blood, and gut rooms.
(4) Basement for cold stores, and chill rooms.

MARKET.

The wholesale meat market is the largest and most important building on the site, running parallel with New York Street, with entrance and official block facing St. James's Hall.

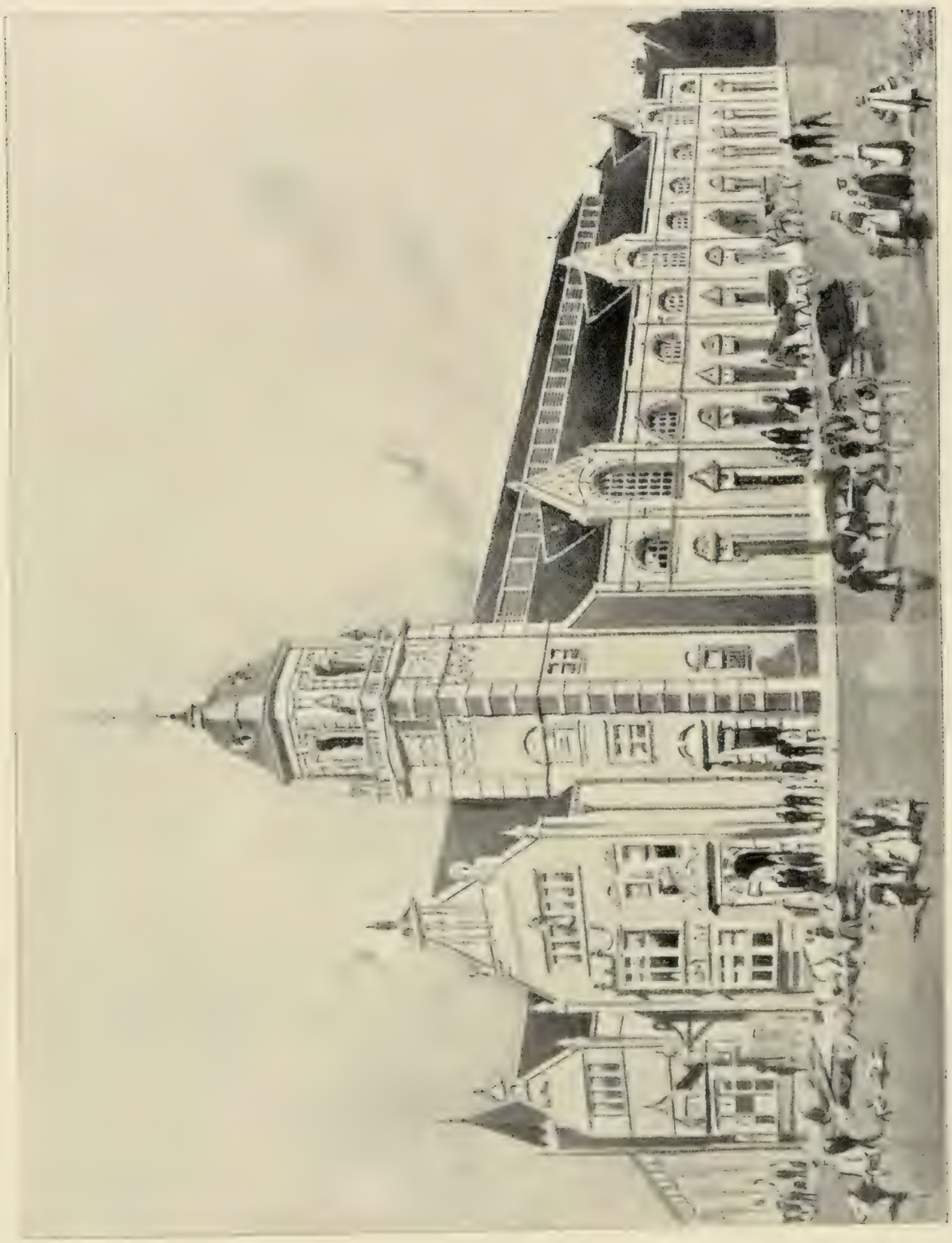
This building is separated on one side from the slaughterhouses by a covered roadway for carts and waggons. On the opposite side to New York Street, direct communication is obtained by means of separate doorways for each stall.

The question of lighting has been fully considered, and the main point of keeping the rays of the sun from the stalls has been observed. The roof is in one span, carried on wrought iron bindings, and the walls for the full height are in white glazed bricks.

The market is 195ft. 4in. long and 45ft. wide, the height to the eaves of walls being 25ft. 8in., and the height to ridge 41ft. 6in.

Hanging accommodation is provided for 1,100 sides of beef, and 1,540 sheep, pigs, or quarters, and is divided into twenty-two stalls, with centre avenue from end to end.

A complete system of overhead travelling rails has been adopted throughout this market, and it is considered that the scheme is the most modern and improved of its kind. From the killing of the



LEEDS ABATTOIR AND MEAT MARKET.

beast to the selling of the carcase, the whole of the lifting and travelling is done by means of connected lines, the slightest pressure being sufficient to propel these loads.

Each stall has direct communication with each individual slaughterhouse, without the disadvantage of passing through the stalls. Also the carcases, if desired, may have direct communication with the hydraulic hoists for conveyance to the chill rooms or cold stores below.

The communication from the market to the slaughterhouses is through the covered roadway, thus providing a speedy means of loading waggons while waiting in the road. A similar method has been adopted in connection with the doors on the New York Street side, where the rails continue to the wall face for discharging the meat on to lurries in New York Street.

The market is fitted with 322 incandescent electric lamps of 32, 25, and 16 candle-power

The salesmen's offices are placed over the central avenue at each end of the market, thus taking up none of the floor space. These are approached by staircases from each end, and are connected in the centre by means of a gangway.

Two hydraulic lifts are placed at the end of the market and the covered roadway for direct communication to cold stores.

The floor of the market is of fireproof construction, in concrete.

The front or official block comprises entrance, with manager's office, lavatory accommodation, etc., on the north side, and with private entrance to the caretaker's house on the south side.

Over these buildings a spacious house is provided for the caretaker, consisting of sitting room, kitchen, bath, lavatory, etc., and three bedrooms.

SLAUGHTERHOUSES FOR CATTLE AND PIGS, AND LAIRAGES TO SAME.

The slaughterhouses for cattle are adjoining the covered roadway, and run in a parallel line with the market, with the end facing to Harper Street. These are placed in a central position, being connected with the covered roadway and market, and on the north side with the lairages, tripery sections, back entrance, and all other parts.

Each slaughterhouse is fitted with the necessary apparatus, allowing two sets of men to work at one and the same time. The line of slaughterhouses are fitted with 54 incandescent electric lamps of 32 candle-power each.

In the rear of each slaughterhouse, waiting pens are provided for beasts, directly in communication with the north doorway.

Over these slaughterhouses, lairages are provided for 100 beasts, and over tripery, blood, and gut rooms, lairage may be found for 120 sheep. The whole of these lairages are approached by means of an inclined way from ground level to first floor level, made to an easy gradient, with drover's safety passage and inlets to same.

The whole of the sloping way is covered with a glass roof for the full length. The floors of lairs are in concrete, with ceilings boarded and walls in pressed brickwork. The whole of the pens are constructed in the best pitchpine, with approved troughs and water supply.

The drainage of this section of the building and the slaughterhouses below has received careful attention. The principle adopted has been as follows: The concrete floors of lairages are specially constructed to convey the sewage to a cast-iron gutter which is fixed on the external wall, and from this it is conveyed down the face of the wall to the ground floor level and connected to channels in concrete.

The slaughterhouse floors are constructed in hard grooved flags with a central channel emptying at the north side. The whole of the outlets and wastes here mentioned are then connected to a longitudinal channel running the full length of the slaughterhouse buildings. This empties into a specially prepared catch-pit, where the sewage is treated before being connected to the drains.

No part of the slaughterhouse open drainage is connected with the public sewer. The only covered drains on the site are those connected to the rain water pipes.

A trolley railway is provided in the rear of slaughterhouses for the purpose of conveying materials to any part.

The whole of the walls throughout this section are in white glazed bricks, and the ceilings are in cement.

In connection with the cattle slaughterhouse, a special slaughterhouse for pigs has been provided, measuring 23ft. 5in. by 17ft. 3in.

This is fitted up similar to the beast slaughterhouses, with the most modern overhead gearing and machinery, and is in direct communication with the pig lairs, which come under the men's mess room. These slaughterhouses are in white glazed bricks with boarded top and flagged floor.

TRIPERY, BLOOD, AND GUT ROOMS.

Directly in the rear of the slaughterhouse buildings, and in direct communication with the north entrance, a continuous block of buildings are placed for the preparation of tripe.

The tripery is fitted up with the most modern machinery, in the form of jacketed pans, boiling pans, steeping tanks, for the treatment of tripe, ropes, etc. The steam for this section is conveyed from the boiler house.

The gut room is fitted with hardwood tables for the gut treatment, and is supplied with hot and cold water.

The blood room is arranged for the treatment of blood by the settling zinc system.

The whole of these floors are in concrete, and the walls are in white bricks.

BASEMENT.

Under the whole of the site of the meat market a basement 15ft. 4in. deep from floor to ceiling is provided. This is made perfectly watertight, with specially prepared walls. The floor is in concrete and the ceiling in cement, and this forms the ground floor of the meat market.

This space is suitable for either cold stores, chill rooms, or general stores. The approaches from each end are by means of spacious staircases, and, in addition to this, hydraulic hoists are provided.

REMAINDER OF BUILDINGS AND GENERAL GROUPING.

In the rear of the site, and in connection with the pig slaughterhouse, is the men's mess room 19ft. 7in. by 16ft. 7in., with cistern room over, and adjoining is the boiler house and engine house.

The whole of the conveniences are placed under the gangway, and consist of general conveniences and private conveniences for stallholders.

The manure pit is placed under the same part.

The roads and yards throughout are paved with wood block floor and Bolton wood setts.

In constructing these buildings, wherever possible, glazed bricks have been used, woodwork omitted, and non-porous hard materials substituted, on account of the rough usage which this class of buildings have to undergo.

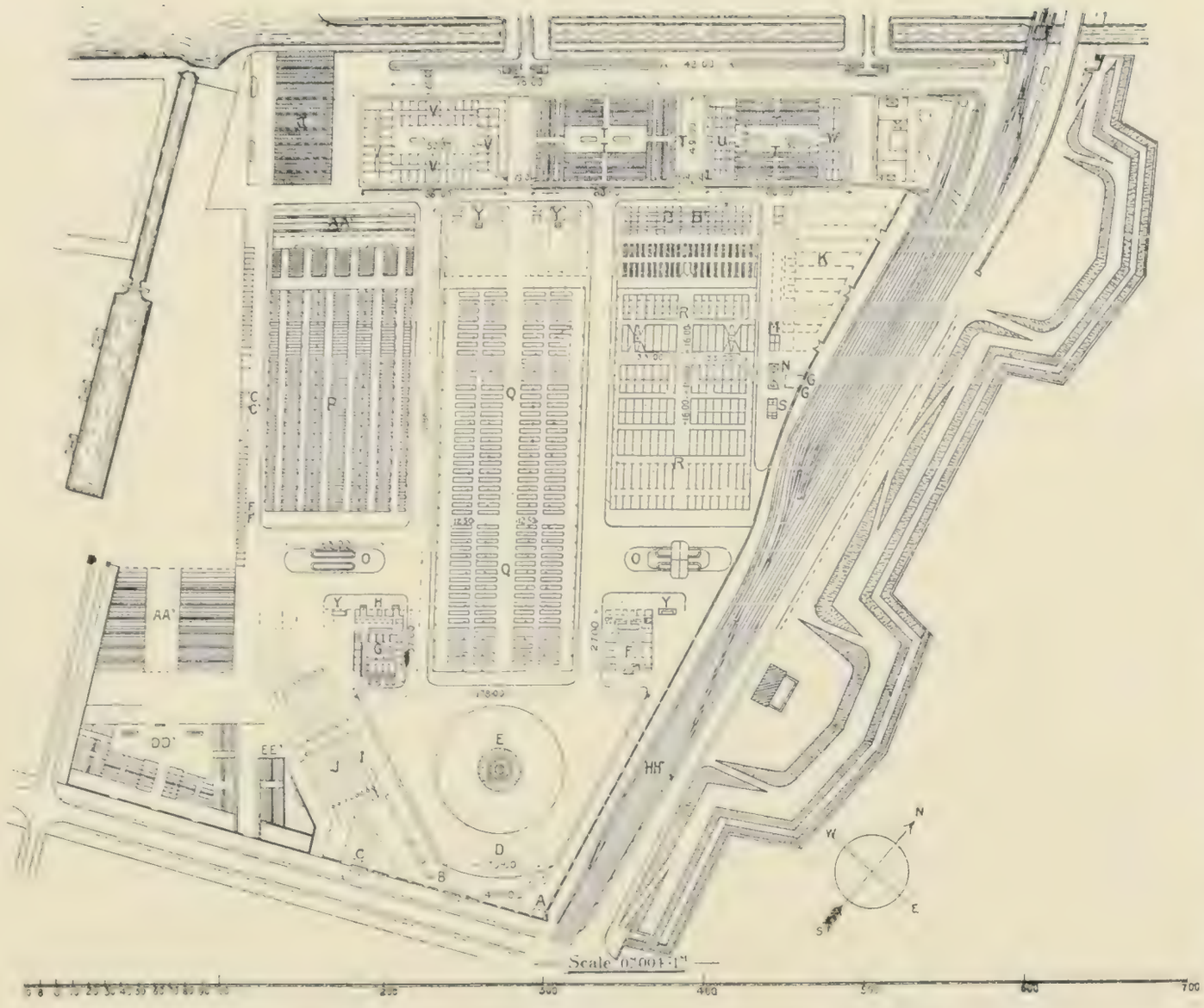
APPENDIX III.

THE CATTLE MARKET AND ABATTOIRS OF LA VILLETTE, PARIS.

The abattoir general of La Villette, Paris, owes its origin to Napoleon I., who by special decree in 1810 ordered its construction. In those days abattoirs were unknown, and Paris therefore led the way in guarding the food of the people. The commission appointed by Napoleon not only recommended the construction of the abattoir at La Villette, but some others, and the year 1818 saw their completion. The names of all of these are: La Villette, Grenelle, Villejuif, and Le Fourneaux. The principal place, however, is La Villette, and as the forerunner of the public abattoir system in Europe it is of great interest. The abattoirs of England and of Germany are of comparatively recent date, and the newer German slaughterhouses indeed are on a totally different design from the Parisian and English system.

The Marché de la Villette opens from the Rue d'Allemagne, and is perhaps one of the largest markets in Europe. Every Monday and Thursday the vast area is one mass of life—human and animal. On these days the markets are held, and sometimes the number of animals entered reach very high figures. The total capacity provided is: Horned cattle 5,000, sheep 25,000, pigs 5,000, calves 2,000.

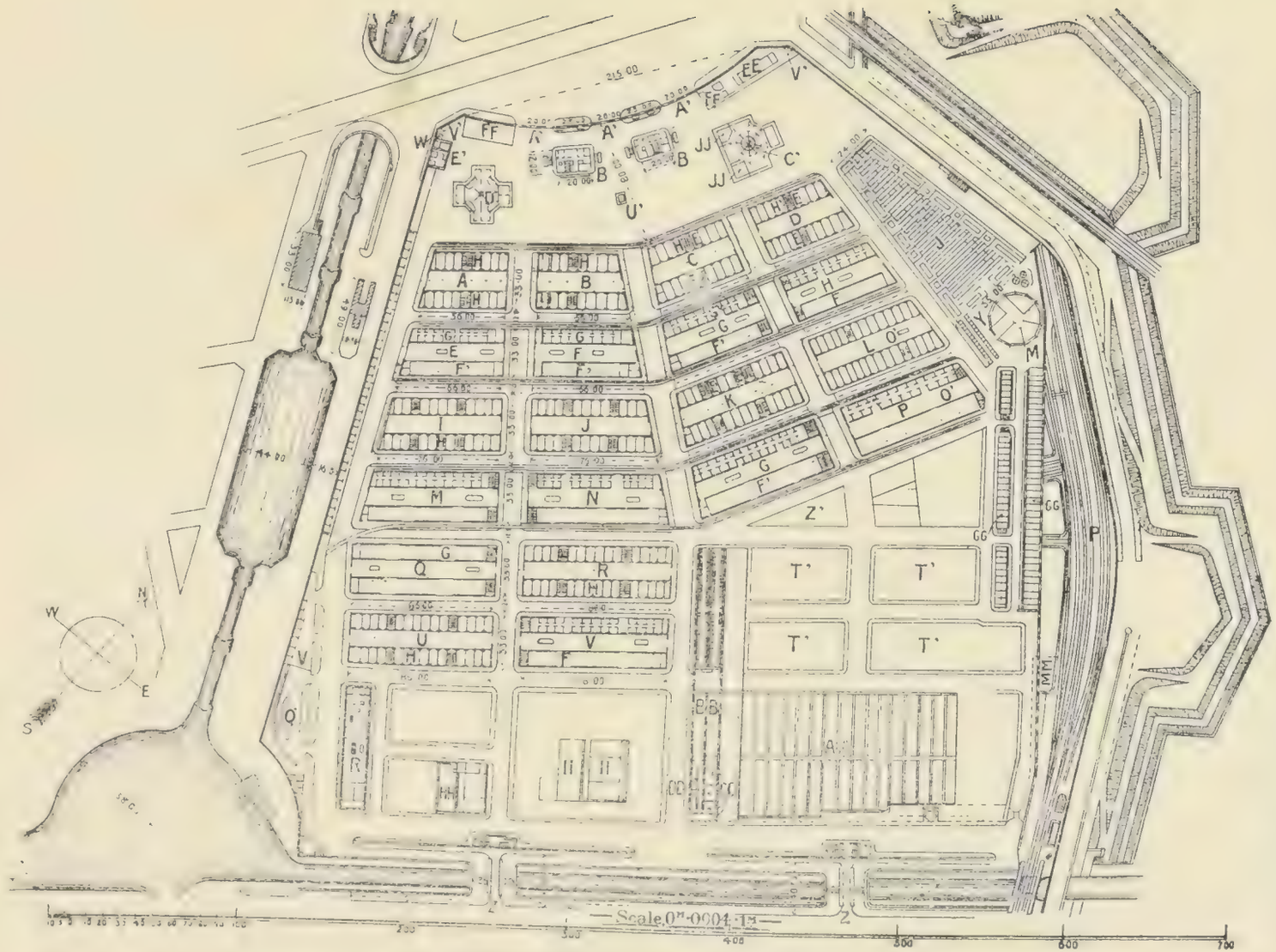
The area covered by the markets is about two hundred acres, and to protect the animals from the weather there are three large pavilions—one for cattle, one for calves and pigs, and another for sheep. Of course, these pavilions do not cover the area mentioned. There is ample room all round, and in convenient places are the administrative and other offices, besides an elaborate provision of stalls for receiving animals, feeding places, etc.



LIVE STOCK MARKETS ADJOINING ABATTOIRS OF LA VILLETTE, PARIS.

INDEX.

A Concierge.
B Toll Office.
C Lookout Post for Firemen.
D Large yard from Rue d'Allemagne entrance of animals coming by carts.
E Fountain of the Chateau d'Eau.
F Administration.
G Market.
H Management Office.
I Pen for counting the Oxen coming on foot.
J Pen for counting the Sheep coming on foot.
K Pen for counting the Beasts coming by rail
L Management.
M Toll Office.
N W.C.'s.
N¹ Scalding of Pigs.
N¹¹ Heating of Irons (Reservoir above).
O Watering-place for Cattle.
P Shelter for Sheep.
Q Shelter for Oxen.
R Shelter for Calves.
S Products from Calves and Pigs.
T Ox Stalls.
U Pig Pens.
V Sheep Folds.
W Calf Stalls.
X Stables, Coach House, and Waiting Room.
Y Restaurants and Taverns.
Z Manure.
Z¹ Bridges over Canal.
AA Temporary Ox Houses.
BB Temporary Pig Pens.
CC W.C.'s, Storehouse for Hurdles, Workshop for Lockmaking and Joinery.
DD Ox House.
EE Milch Cows.
FF Sheep Folds.
GG Dead Pigs.



ABATTOIRS OF LA VILLETTE, PARIS.

INDEX.

A Principal Gate in the Rue de Flandre and Entrance Gate.
B Toll Office and Concierge.
C Public Auction.
D Old Tripery and Lodgings.
E Police and Fire Station.
F Ox Houses.
G Sheep Folds and Stables for Calves
H Scalders.
I Railway on the eastern side
J Hanging House.
K Scouring.
L Singeing House.
M Passage from the Pig Pens.
N Gut House.
O Pigsties.
P Railway for the service at the Abattoir.
Q General Passage.
R Tripery.
S Outhouses at the Tripery.
T Space for Buildings to be constructed.
U Clock
V Gas Meters.
W Place for storing materials.
XX Sheep Fold.
Y Dressing Rooms for Butchers.
Z Manure House.
AA Principal Sanatorium.
BB Ox House and Sheep Fold.
CC Washing Tanks for Sheep coming from abroad.
DD Lazaret.
EE Room for engaging Butchers.
FF Various.
GG New Pigsties.
HH Electrical Works.
II Refrigerator.
JJ Enlargement of the Public Auction Room
KK Extensions of Toll Offices
LL W.C.'s.
MM Platform from the Sanatorium.

The number of animals received into the market during the years 1896-7-8-9 is given below :

RETURN OF ANIMALS BROUGHT INTO THE CATTLE MARKET, PARIS.

Bullocks, cows, and bulls	1896—300,243	Sheep	1896—1,755,174
	1897—312,106		1897—1,849,764
	1898—331,417		1898—1,906,897
	1899—354,515		1899—1,933,253
Calves	1896—166,467	Pigs	1896—528,171
	1897—167,468		1897—585,434
	1898—175,942		1898—517,681
	1899—180,719		1899—464,253

NOTE.—About one quarter the number of cattle exposed for sale in the market is delivered in the outskirts of Paris.

Every market day a large staff of veterinary surgeons is present and they examine the animals. They have to rely, to some extent, on the assistance of the market attendants, who cull out any suspicious-looking animals to begin with. The larger animals are stamped, if apparently sound, and may then be disposed of for slaughter. The smaller animals, owing to their number, are not specially stamped, but great care is taken to remove into separate places all those that are sickly looking.

If any animal is found to be diseased it is at once marked as condemned, and the name and address of the owner are inscribed on a docket which accompanies the animal immediately to the abattoir. The animal is received by an inspector there, and he must see that it is slaughtered, and certify same on the docket, which is then returned to the veterinary surgeon who condemned it. All diseased animals and confiscated carcases become the property of the municipality, who provide for their destruction in an apparatus for that purpose.

The sources from which the majority of the animals come to La Villette are French—principally Normandy, Anjou, and Poitou. Normandy, being the great cattle-raising country of France, provides perhaps the largest number. Brittany provides the pigs, these being largely fed on separated milk from creameries.

Separating the cattle market and the abattoir is the Canal de Lourcq, and it extends from the canal to the Rue de Flandre. Here a huge portion, at least, of the vast number of animals which are required for the food of Paris are slaughtered. As the markets are

held on Mondays and Thursdays, so the greatest killing days are Tuesdays and Fridays. The number of animals handled may be seen from the following table :

RETURN OF ANIMALS SLAUGHTERED IN THE ABATTOIRS OF LA VILLETTE DURING 1896-7-8-9.

It must be noted that some animals are brought to the abattoirs direct without passing through the market—especially calves.

Cattle	1896—213,679	Sheep	1896—1,520,055
	1897—218,293		1897—1,563,137
	1898—228,970		1898—1,634,235
	1899—245,745		1899—1,680,381
Calves	1896—193,339	Pigs	1896—219,528
	1897—198,364		1897—233,399
	1898—207,779		1898—212,837
	1899—220,413		1899—200,315

The abattoirs consist of some sixty-four pavilions, and cover about sixty-seven acres. The administration is totally different from the cattle markets, and veterinary inspectors are constantly on duty examining the meat after it is hung up. Every veterinary surgeon has a number of qualified assistant meat inspectors, and so each portion of meat has to pass through official hands before being allowed to be taken away.

The regulations which are in force for the inspection of meat, the control of the abattoirs, and the Central Halls in Paris, and a description of the characteristics of condemned meat are briefly stated in the following :

INSPECTION OF MEAT.*

Police Regulations of the 13th Oct., 1879.

All fresh meat exceeding three kilogs. weight in amount, and all salted or smoked meat more than five kilogs. in weight, must be inspected when it enters the city. For this purpose, inspection offices are placed at the gates of Saint Cloud, Ternes, Clichy, La Villette, Vincennes, Charenton, Italie, and Orleans.

If it is desired to bring meat into Paris after the regular hours by other gates than the above mentioned, by railroad or by boat, it may be done on condition that the meat be taken, at the expense of the bringer, to the nearest abattoir or to the Central Halls, under the escort of a Custom House official, where it will receive the regular inspection.

Meat recognised as unfit for food is immediately seized, and destroyed at the cost of the owner; but the latter has the right to appeal to the court if he thinks the seizure illegal.

If the owner of the condemned meat wishes to keep it for the manufacture of tallow, etc., he may obtain permission, but in that case the meat must be specially treated in the presence of the inspector at the cost of the applicant. Numerous incisions are made in it; it is sprinkled with powdered charcoal and spirits of turpentine or ammonia.

*From "Public Health and its Applications." By Albert Palmberg. Swan Sonnenschein and Co. (1895).

If the owner of the meat protests against the seizure, and demands another examination, the meat is taken to the office of inspection in the Central Halls, and is again examined by one of the veterinary surgeons in the service of the Prefecture of Police, designated by the owner himself. If the meat be confiscated, either wholly or in part, the cost of the examination must be borne by the owner.

All meat, whether sold in slaughterhouses, markets, or butchers' shops, must be submitted to inspection. The same obligation is in force for the offal and the products of manufacture. This inspection must be made in every shop at least twice in the month.

The inspectors of meat are also entrusted with the examination of poultry, game, and fish.

A large number of private slaughterhouses were built in the outskirts of the city in consequence of these vigorous measures enforced in Paris. These have been placed under the supervision of ten special inspectors since 1883. Their jurisdiction extends over the whole of the department of the Seine.

CONTROL OF ABATTOIRS.

Regulations of the 28th of October, 1829, 25th March, 1830, 23rd October, 1854; Police Orders of the 29th August, 1879.

It is forbidden to slaughter cattle and to dress the carcases in any other place than the abattoirs built and arranged for that purpose, which are under the supervision of the Prefecture of Police.

Pigs affected with measles must not leave the abattoir. Beasts dying during transport, killed suddenly through accident in the market, the railroads, the public roads, or at the cattle breeders, must be taken to the nearest abattoir. An inspector will examine them and decide whether the meat is to be sold or destroyed.

In all cases the flesh of animals dying a natural death must be destroyed at the expense of the owner.

No beast can be slaughtered in a stable or a yard, except in cases of extreme urgency ascertained by the inspector.

Calves and lambs dying a natural death must be destroyed in the slaughterhouse itself, and not taken away from it on any pretext.

Beasts suspected of disease, and therefore placed under observation in the stables of the abattoir, must only be slaughtered in the presence of an inspector, who must examine the viscera.

Meat and offal must only be kept in the places appointed for that purpose. It is forbidden to withdraw them from inspection in any way whatever.

The meat of slaughtered animals is examined, and what is judged to be bad is confiscated.

In case of protest, the flesh and intestines of the animal are sent to a special place and examined by an expert. If the intestines are wanting the protest is null and void.

If no claim has been made at the end of twenty-four hours, the meat is destroyed at the cost of the owner.

The meat seized or deposited with the inspectors is at their disposal, and must not be taken away or destroyed without an order from them.

All attempts to deceive the buyer as to the quality of the commodities, as, for instance, by the blowing up of meat, are punishable by fines.

CONDEMNED MEAT: ITS CHARACTERISTICS.

The legal enactments which form the basis for the inspection of meat in Paris are the articles 475, 477, and 479 of the Penal Code, besides the law of the 27th of March, 1851, in virtue of which the sale of adulterated or deleterious food is forbidden.

The flesh of animals suffering from fever is easily recognised in the abattoirs, where the beasts are examined as they stand, and their internal organs after slaughter. But serious difficulties occur in forming judgment as to foreign meat. The points relied upon by the veterinary inspectors of Paris, whose scientific education is perfect, rest on observations carefully pursued during long years.

These points are the following:

1. The meat is red, more or less dark and of a dull tint.
2. The abductor muscle of the thigh has a grey earthy or ochreish tint.

3. The serous membranes of the abdomen and chest are furrowed with branchings of a leaden grey or livid colour produced by hypostatis.

4. The suet and fat exhibit more or less vascular injection, giving them the appearance of being streaked with wine. At other times the fat has a peculiar colouring—like wax—which has taken a smoky tint. This is noticed chiefly in the depression between the lumps of fat.

5. A purplish discoloration of the loins. This sign is seldom wanting.

6. The veins contain more or less blood.

7. A brownish or blackish discoloration of the soft parts of the vertebræ when dissected.

8. The muscular tissue is less firm. When one or other of the following indications is observed, the blood must be examined through a microscope:

If there is only a slight rosy vascular injection in the tissues beneath the skin, if the fat is white inside, the flesh firm, of good appearance, without infiltration, or abnormal colour, the meat is passed.

Any unpleasant odour shows that the meat is not in normal condition. Such odour will be most perceptible at the incision of the muscles—particularly the abductors of the thigh and of the leg—and the great muscle under the shoulder blade.

Sometimes when a muscle of a dull brown or grey colour is cut, the section takes a pale red colour on exposure to the air, which remains even after cooking the meat.

When this change of colour occurs, the section is covered with a glutinous serum. Bloody infiltrations of serum are also often noticed in the cellular tissue between the muscles.

Another most important and common sign is that in the change of colour many tints are assumed, so that the meat seems mottled. The dominant colours are pale rose, dark red, and grey. This last is seen chiefly at the edge of the muscles. It is in cutting the sartorious and pectoral muscles that these changes of colour are most noticeable.

The bundles of muscles near the bones have a pale rose tint, while the others are dark rose.

The presence of exudations in the lymphatic glands is also an important indication.

As to tuberculosis, the rule is that if the lymphatic glands are affected, if dropsy is present, seizure is imperative. It is also if the tubercules have caused emaciation. Otherwise the parts invaded by tubercules only are condemned.

Considering the difficulty in ascertaining the presence of tuberculosis merely by examination of the meat, it is ordered that the meat examined should be at least the size of one-quarter, and that the lungs should be comprised in one of these pieces.

There is no examination for the discovery of trichinosis in Paris. At the time when scientific interest was much excited on this subject, the inspectors made microscopic investigations, but as not one case of trichinosis was found after three thousand animals had been examined, the researches have been abandoned. There is no reason to fear that disease in France, England, or Belgium, as the people do not eat raw pork.

CENTRAL HALLS.

In Paris, as in London, the wholesale traffic in provisions needing careful supervision is centred in one place, the Central Halls.

At present the market covers a space of 40,390 square metres, but it will be shortly enlarged.

There are ten pavilions connected by covered passages. They are arranged in two sections—one of four and the other of six, separated by the wide Baltard Street. The pavilions and sections form a perfect square. Each pavilion is divided into a number of shops. Underground are storehouses and cellars.

The sections composed of four pavilions are at the left of Baltard Street. They are devoted to the sale of meat and offal, game, poultry, fruit, and vegetables.

The larger section of six pavilions is set apart for tubers, legumes, fish and shell fish, butter, and cheese.

The exchange is near the market. The wholesale traffic is conducted by brokers or auctioneers. It commences in winter at 6 a.m., in summer at 5 a.m., and ends at 9 a.m. A bell then announces the retail sale.

The inspection of meat at the market is made in the following manner: Each piece of meat is marked with a number, hung on a hook, and then examined by the inspectors. The good pieces are marked with a "V" *(à vendre)*; the doubtful are taken to a special room, there to receive a careful examination. After exact anatomical and microscopical investigation, the inoffensive portions are returned, but all the damaged or diseased parts are condemned. The condemned meat is used for the food of the wild beasts in the Zoological Gardens, or else it is destroyed as before mentioned.

After the Central Market, the market of St. Germain, near the Church of Saint Sulpice, is the largest place for the sale of general provisions. The market of Porte Saint Martin is principally for the sale of poultry. The private shops of each quarter are organised in the same way as those in London and Brussels previously described.

The display of merchandise is nowhere better understood than in Paris. Even the meat is garnished with flowers and foliage.

The veterinary inspectors, after examining slaughtered animals, either pass them or confiscate them, accordingly as they are sound or otherwise. Sound meat is stamped in a large number of places with the official stamp, as shown. The "P P" means Prefecture of Police.

The slaughtering pavilions at La Villette are all pretty much on the same design, with the exception of the pig slaughterhouse, which differs from the rest. Each pavilion consists of a wide main hall, glass roofed, and on either side are numbers of cubicles, which are rented by the butchers of Paris. These are their booths for the slaughtering and hanging of their meat. The cattle are knocked down at the entrance to these

booths, and when dressed are hung up inside. The sheep, however, and smaller animals, except pigs, are generally slaughtered in the main halls. The design of these slaughter-halls does not commend itself to modern ideas. If the visitor interested in such matters will visit these shambles on any slaughter day he will find the halls one heterogeneous mixture of men and animals, and the carcases of animals in every stage of the process of slaughter.

This killing of animals for food is undoubtedly not a pretty business, and the first view of one of these Parisian slaughter-halls to anyone who has not witnessed slaughtering before must be very revolting. The cattle are led up the Central Halls amongst all the scene of reeking flesh, and often kept waiting their turn while others are being slaughtered. Now, this is not right. These animals, judging from their appearance, are cognisant of what is happening, and the muscles seem to become rigid with fear, while the eyes roll wildly, and the quick sensitive sniff of blood seems to make the poor brutes quiver. The same thing happens with regard to the sheep and calves. They are all huddled together close to where the others are being slaughtered, and in full view of what is taking place.

Paris led the way in Europe in the establishment of abattoirs, and now has a most perfect system of meat inspection. Is it too much to hope that the municipality will also follow the dictates of humanity in the slaughtering of animals for food, and insist that animals will not be kept waiting for slaughter in the view of others being slaughtered ?

The slaughter of pigs in Paris is a very primitive affair. The pigs are driven into large pens in varying numbers, and are stunned with wooden mallets. Their throats are then cut, and the knife is thrust inwards so as to sever the aorta. The blood rushes out and is caught in shallow pans by stalwart women, who carry it to receiving pans, where it is kept from coagulating by agitation. It is ultimately used for black pudding making.

So as to drive out the last traces of blood, the hind portions of the pigs are raised and jolted.

When the blood has been let out, the pigs are laid on a layer of straw on the floor and are covered over with the same material. This is lit, and as it burns it singes off all the hair. The pigs are

then raised (by hand) on to a trolley or low hand waggon, and are wheeled into the adjoining compartment—a large hall—where gambrels are inserted into the hind legs, and they are washed, scraped, disembowelled, and dressed.

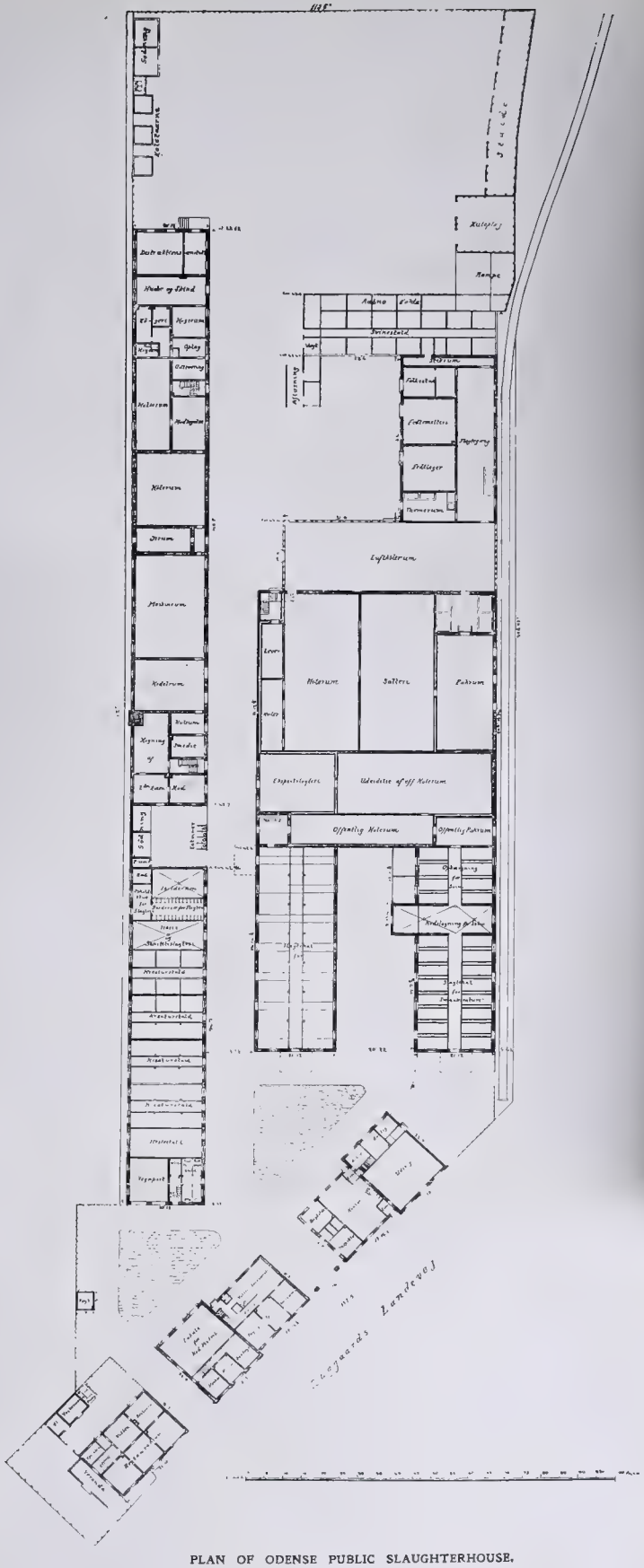
It will be noticed that every process is by hand, and such conveniences as pig singeing furnaces, spraying nozzles, and continuous track bars are unknown to the Paris abattoirs. In this respect the municipal authorities have much to learn, and a visit to a modern bacon factory would surely convince them that modern methods are the best.

The same rigid inspection of pigs takes place as of other meat, and the veterinary inspectors have the same routine to go through in the pig slaughtering department as in the others.

Departments are provided within the walls of the abattoirs for all the necessary subsidiary operations, such as tripe cleaning, gut washing and preparing, blood drying, etc., and all these operations are under official supervision.

The mechanical equipment is very extensive, and there are large installations of refrigerating plant and electric lighting.

The tracking throughout the abattoirs is of an obsolete pattern, and entails a very large amount of hand labour, which modern appliances altogether avoid.



PLAN OF ODENSE PUBLIC SLAUGHTERHOUSE.

APPENDIX IV.

EXPORT SLAUGHTERHOUSE AT ODENSE, DENMARK.

The town of Odense is situated in the centre of the island of Fiun, and in the midst of a large area devoted to agriculture. Denmark is altogether a country which owes its prosperity to the hard work of its agriculturists; and the splendid factory at Odense is an example of the enterprise of the Danes. The factory owes its existence primarily to two enterprising gentlemen—Messrs. Dessau and Küster—and was constructed for the purpose of forming a central depôt for the slaughter and export of cattle, pigs, etc. As a necessary preliminary, these gentlemen obtained from the town a very valuable concession with regard to the slaughtering of animals within the bounds of Odense, and this has since realised to the original concessionnaires a very handsome profit, as some time ago the factory changed hands, and was purchased by a farmers' co-operative society, thus adding perhaps the finest factory in Denmark to those already conducted by farmers' co-operative associations. Altogether in Denmark there are nearly fifty slaughtering factories, and the majority of these are run by farmers themselves; these factories are for the most part devoted to bacon curing as the primary business, but they also, more especially of late, slaughter cattle for export to England and Germany. The factory at Odense—which rejoices in the following name, "Odense Offentlige Slagtehuse og Exportslagteri"—is built on the most generous design, and approximately is worth about £75,000 sterling. It is situated alongside the State Railway, and has its own railway siding, so that animals can be delivered direct into the factory. Goods for export also can be delivered right on to the waggons. At the entrance to the factory is a superb suite of offices—more like a prosperous bank than the offices of a slaughterhouse. On the same line of the street are a number of places which are unfamiliar to those acquainted only with British abattoirs. There is first of all a veterinary inspector's department, where a fully-equipped

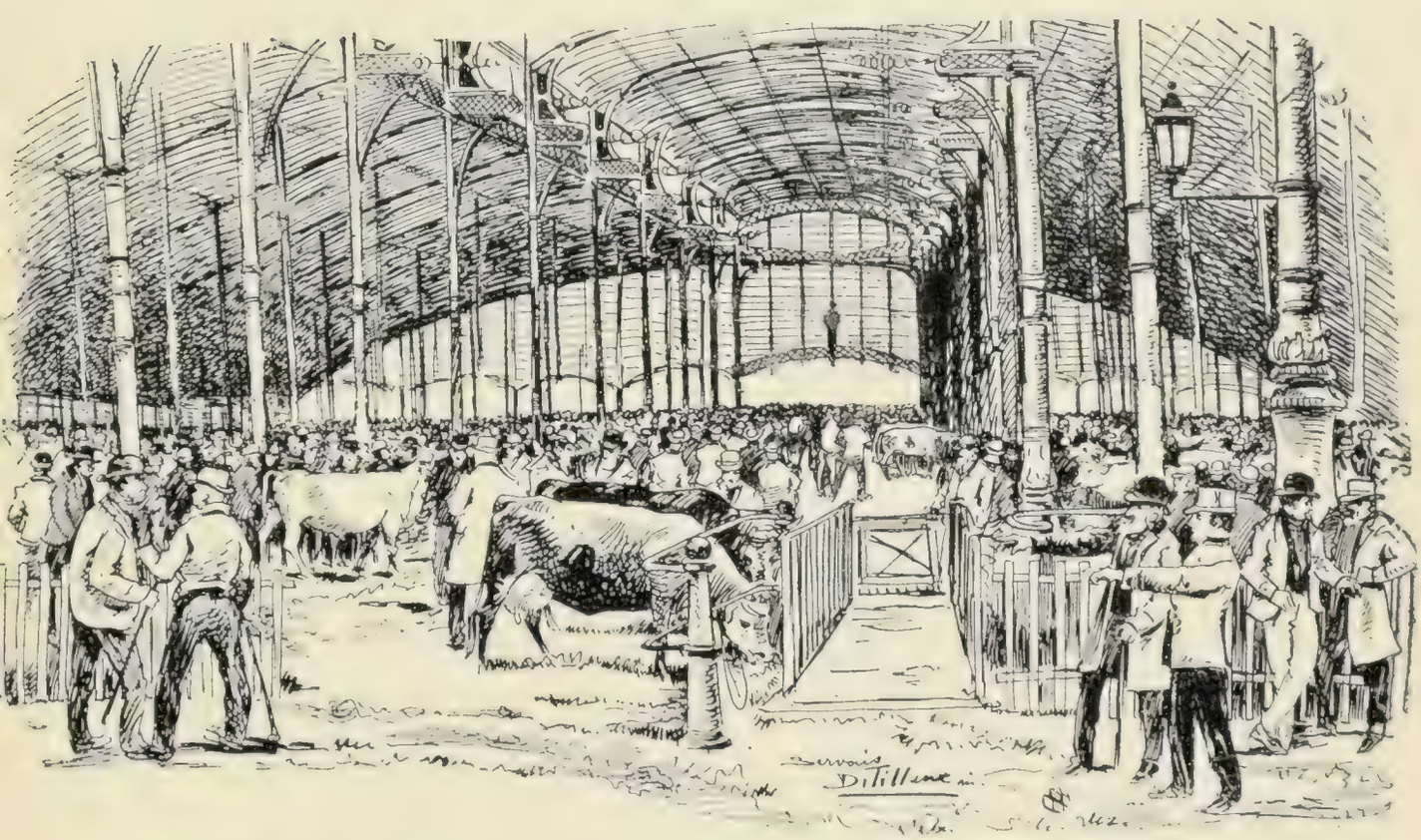
veterinary surgeon's laboratory is in daily use. There is also a large and handsomely-furnished shop for the retail sale of goods, and adjoining is a restaurant for the use of the workers in the factory ; all these buildings forming a very imposing frontage. The factory itself has accommodation for the slaughter of all kinds of animals, such as horses, cattle, calves, pigs, etc., but the pig department is attached to a bacon-curing factory, and at the present time about 1,000 pigs per week are cured in the Wiltshire style and sent to England. Besides making bacon and exporting meat, a very large department is devoted to sausage making, but sausage making of a kind that is unknown except in Denmark. One of the features of the factory is the splendid manner in which all the by-products are utilised. There is an apparatus first of all for cooking meat which is only slightly diseased, in a thorough manner. It is well known that many diseases of meat are perfectly innocuous to the human subject if the meat be heated at a high temperature, but this cannot be guaranteed in a private house ; hence the authorities of this abattoir cook questionable meat at a very high temperature, and it is sold in the cooked state to the poorer people.

Another appliance which, indeed, seems to be of great value at Odense, as at Aarhus, is a Podewil's apparatus or "destructor." This is designed with a view to working off in an innocuous way all diseased animals unfit for food, and also the slaughterhouse refuse. The products of the apparatus are fat and dry powder, and these two substances are produced without any offensive smell from carcases of animals or from any animal refuse whatever. The whole of the carcases are put into the apparatus, and bones and everything else ultimately emerge as a dry, soft, brown powder. This powder contains something like seventy to eighty per cent. of protein, and is used for feeding cattle and pigs, being a very nourishing and palatable food.

The machine room is a very handsome structure, and contains duplicate refrigerating machinery, as, of course, would be essential in such a large factory.

APPENDIX V.

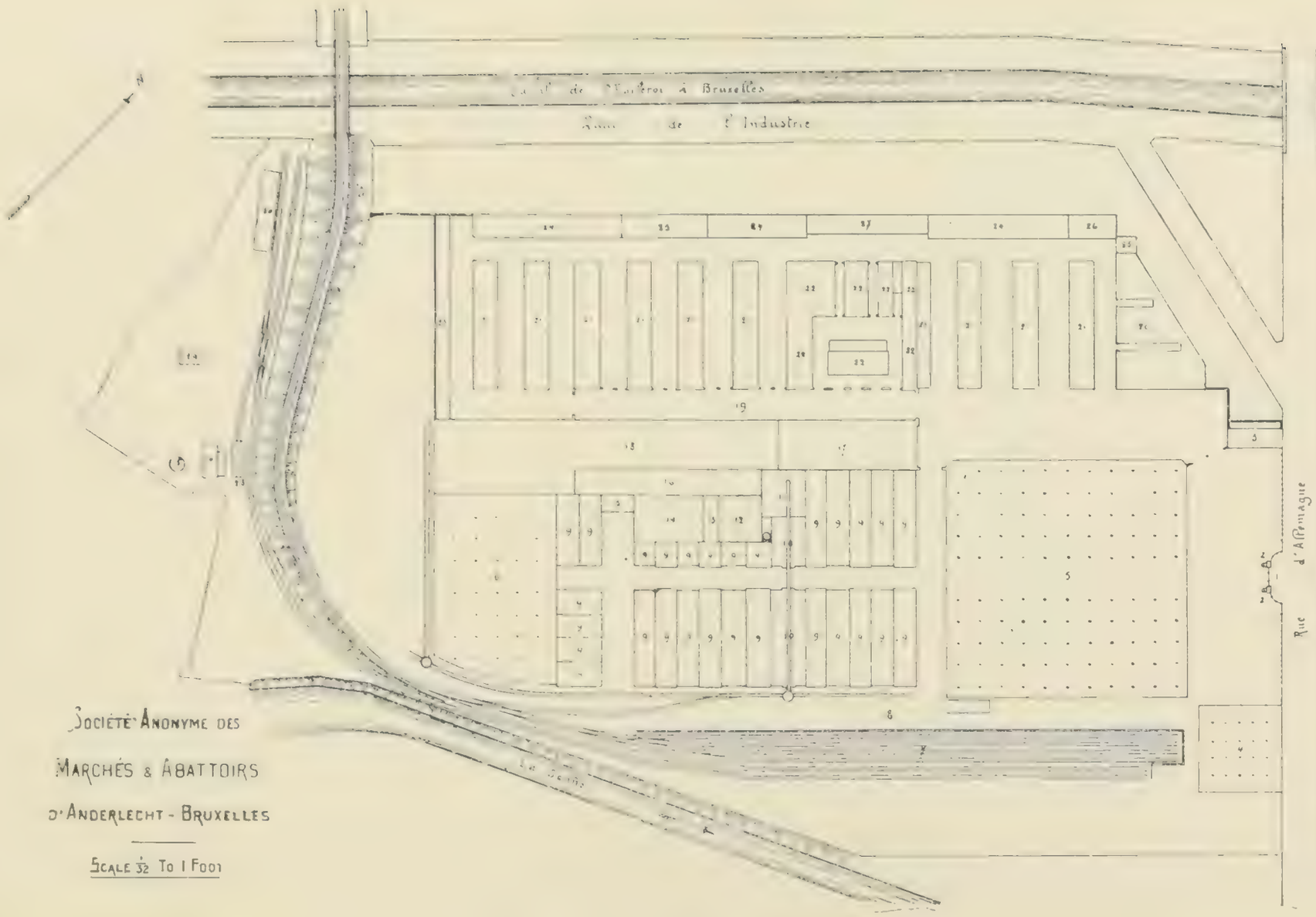
THE CATTLE MARKET AND ABATTOIRS OF ANDERLECHT, BRUSSELS.



GENERAL VIEW OF INTERIOR OF CATTLE MARKET, ANDERLECHT, BRUSSELS.

The Anderlecht cattle market and abattoirs in Brussels were established in 1898 to replace the numerous small abattoirs then existing in the city, and also with a view to centralising the cattle trade. The project was carried out by a public company who have succeeded in providing splendidly equipped premises, and which leave nothing to be desired in the way of hygienic arrangements or ample provision for the accommodation of all kinds of animals.

The premises occupy a very suitable site on the outskirts of Brussels at the entrance to the communal district of Anderlecht,



INDEX TO GROUND PLAN OF ANDERLECHT CATTLE MARKET AND ABATTOIRS.

1 Entrance.
2 Porters' Lodges.
3 Offices.
4 Market for Sheep.
5 Market for Cattle and Calves.
6 Market for Pigs.
7 Railway Loading Platforms
8 Loading Quay.
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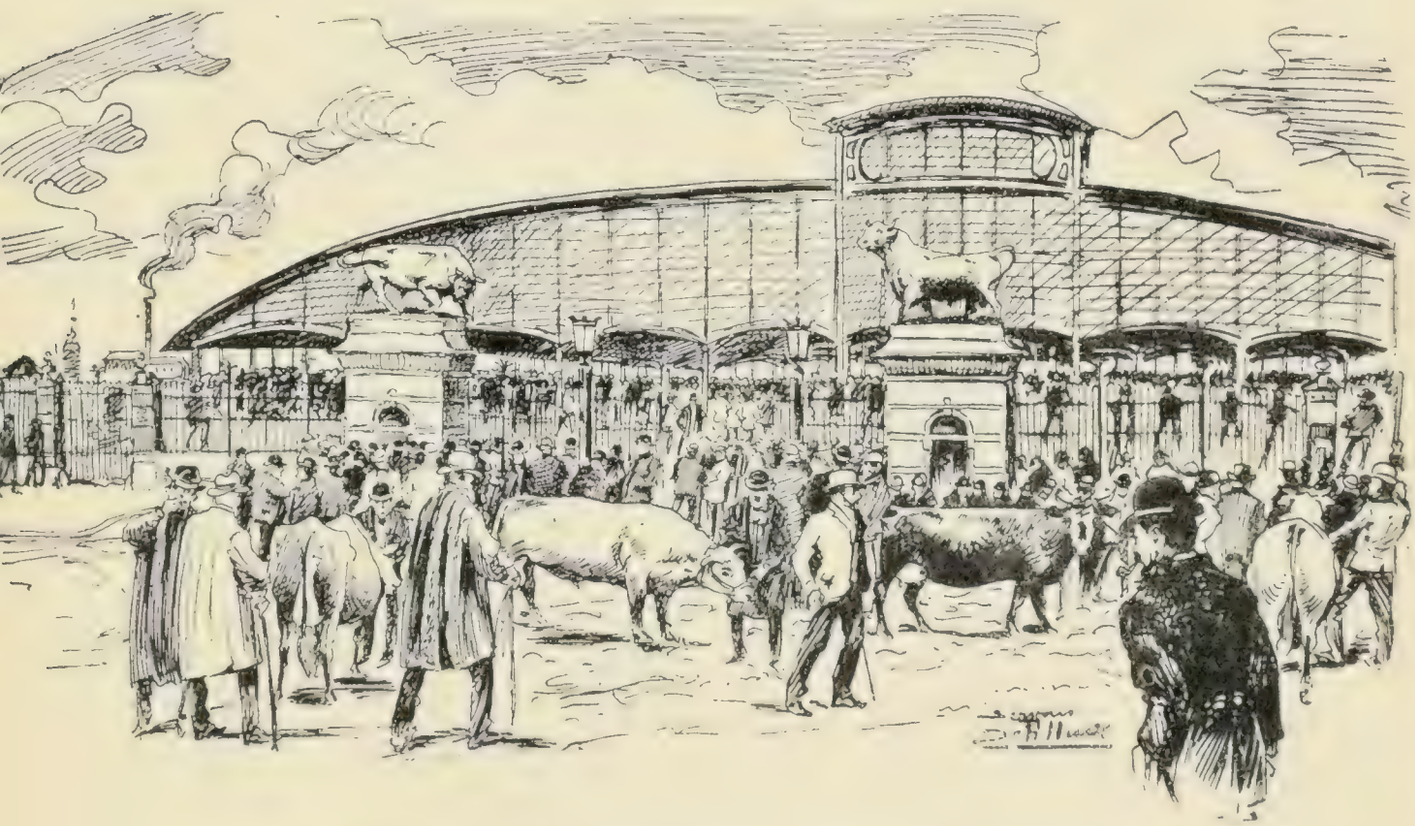
30 Manure.

with a frontage to the Rue D'Allemagne, and situated about 650 yards from the Brussels south station, and they have been made use of to the greatest advantage. The market is provided with sidings on the Belgian State Railway, and is also served by the canal from Brussels to Charleroi. The total area occupied by the market and abattoir buildings is about 150,000 square yards: the main entrance being in the Rue D'Allemagne, at the junction of the latter with the Rue Huyvaert. The premises are enclosed on this side by an iron railing, with four entrance gates, and which is 400ft. long. The principal gate is flanked by two fine pillars



ENTRANCE TO CATTLE MARKET, ANDERLECHT, BRUSSELS.

capped by figures of bulls after Isidore Bonheur. A roadway 160ft. wide extends the whole length of the railing. On the right are the offices of the company and the gate leading into the section devoted to the abattoirs; on the left is the sheep market, which occupies an area of 1,900 square yards, while in front is the market for large cattle, covering an area of 12,000 square yards, and in which 2,200 head of cattle can be exposed for sale at the same time.

This market is flanked by six inspection places, and has also weighing machines for weighing cattle.

On the left of the market is the loading platform for the railway, as well as the special station—three locomotives belonging to the company being employed in the service. Seven railway tracks are made use of, of the total length of 330 yards.

Behind the cattle market are placed the lairage sheds, which are capable of containing, when full, 16,000 horned cattle. In the centre of this block of lairages are placed the two large fodder stores, with a railway track running right through them. All these buildings are only one storey in height, and are lighted and ventilated from above, from the north-east side. Beyond the lairage sheds will be built the pig market, the space allotted for this being 5,000 square yards, enabling 41,000 pigs to be offered for sale at one time. All these buildings already described, devoted to market purposes and lairage requirements, are entirely separated from the abattoir section by gates flanked by offices for inspectors and experts.

The entrance to the abattoirs for cattle for slaughter is by a gate at the end of the avenue separating the large market from the lairage. The exit from the abattoirs is by the gate adjoining the company's offices at the main entrance to the market, already described. The abattoirs consist of—

1. Nine blocks of slaughterhouses for cattle, including bulls, calves and horses. Each of these blocks is divided into chambers, the number of these varying in each block according to the importance of the master butchers who occupy them. Altogether, there are ninety stances for slaughtering, with the necessary apparatus for hanging, and overhead rails. The whole installation is calculated to provide for the slaughter of 1,800 to 2,000 beasts per day.

2. The pig abattoir comprises seven complete slaughter-halls, each consisting of sties, slaughter-chamber, and hanging room. The whole of this section allows for the slaughter of 800 pigs per day.

3. The section devoted to the slaughter of sheep comprises eight complete slaughter-halls, each including sheep folds, slaughterhouse proper, and hanging room. The whole of this section permits of slaughtering 1,250 sheep per day.

4. The triperies, necessary for the treatment of the intestines.

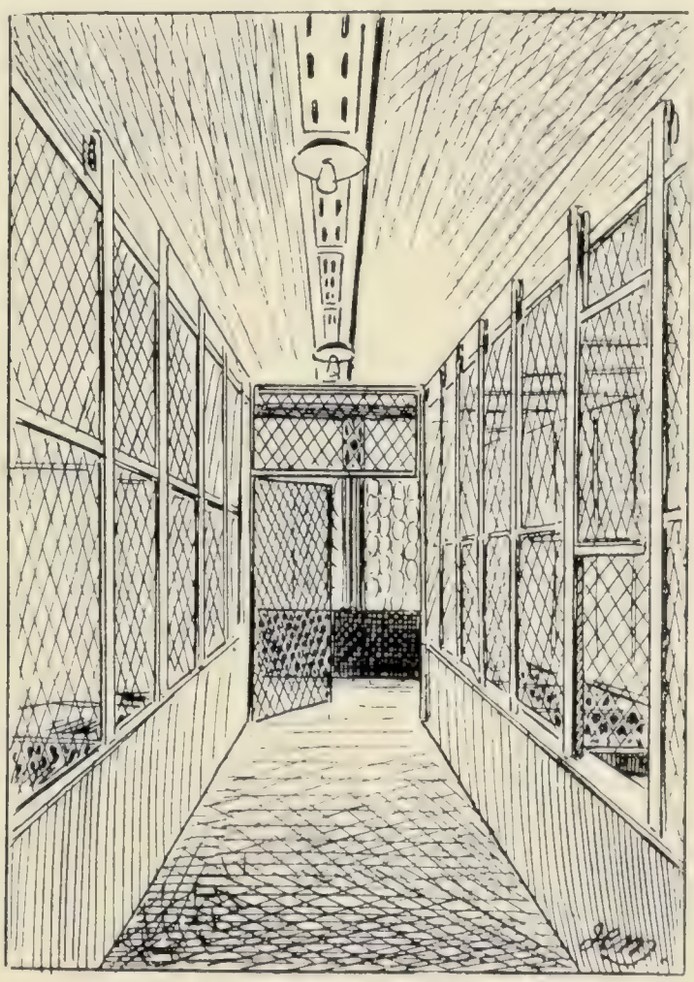
5. Rooms for cleaning the offal.

6. A kennel for the dogs used as beasts of burden.

7. Two sheds for carts, etc.

8. A shop for the sale of the sheepskins.

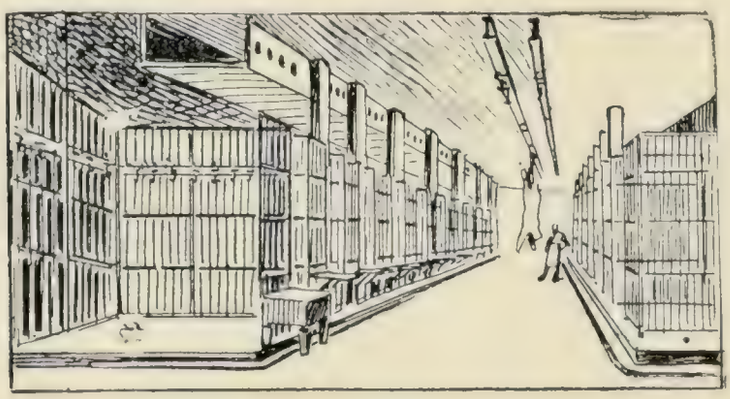
9. A central hall, 520ft. long and 45ft. wide, separating the abattoirs from the refrigerating chambers, and ensuring that the handling of the carcases shall be all done under cover, whether during their transport from the abattoirs to the cold rooms, or when later on they are taken from it.



VIEW IN COLD STORE SHOWING SALTING OR PICKLING TANKS.

10. The cold store for all kinds of meat. This last building comprises: (A) An engine and boiler house in which there are five boilers, each with a heating surface of 330 square feet; a shed for coals and cinders; a chimney shaft, 140ft. high and 5ft. diameter at the top; a building for the five ammonia compressors; water

tower, small repairing shop, and a room for the various other appliances in connection with the refrigerating installation. (B) A building for the storage of meat, of 680ft. in length, with a superficial area of 6,300 square yards, divided into two portions, each consisting of a ground floor and first floor. The ground floor of the first part serves as a preliminary cooling room or hanging house to receive the freshly killed carcases, which remain there for twenty-four hours before being taken into the cold room proper. This portion contains the staircases and the lifts which serve the cold stores, as well as the office of the inspector, and various cupboards for the articles used on the premises. The available area for carcases is about 1,250 square yards, or sufficient for the accommodation of 650 head of large cattle or 600 small. The floor above the cooling room is devoted



INTERIOR VIEW OF COLD STORE SHOWING LOCK-UP COMPARTMENTS OR CUBICLES.

to the preservation of articles of food, other than butchers' meat, or sausages, etc. This has a separate entrance, and is served by a special lift. The second part of the cold store building has an area of 4,750 square yards. Near the centre there is a staircase for carrying up the carcases as well as a lift, and the office of the superintendent. The greatest part of the lower floor is devoted to the storage of pork, both fresh and pickled. Another portion is given up to frozen meat, while a third part of this floor is used for the manufacture of ice. The space allotted to fresh pork will contain 440,000 lbs, and that to pickled pork or bacon 66,000 lbs. The ice-making plant has a capacity of 1 ton of ice per hour. The whole of the upper floor is devoted to butchers' meat—beef, veal and mutton

—there being space sufficient to contain 1,100,000 lbs. of fresh meat. The two floors are divided into lock-up compartments, separated by iron divisions. These compartments vary in size, the smallest being 3ft. 6in. square. They are let by the year to butchers, who can make what use of them they like, provided they conform to the general regulations of the establishment.

The slaughtered animals, after having been flayed and cleaned in the abattoirs, are hung, in sides, on roller hooks travelling on overhead rails running from the slaughterhouse in all directions towards the central hall, from whence they run into the cooling room, where the carcases undergo the first chilling at a temperature of 45° to 47° F., for a period of eighteen to twenty-four hours. They are then divided into quarters, which are conveyed on the overhead rails to the lifts and taken direct into the cold store, that being kept at a temperature of 39° to 45° F. On finally arriving at their destination the quarters are unhooked in order to be placed in the compartments of the cold room, whence the butchers can take them according to their requirements. The establishment is completed by some premises on the other side of the railway track, which include a shed for the locomotives, another engine room, also steam pumps, coal shed, water tower, abattoir for condemned animals, and manure heaps.

The following table shows the progress made since the opening of the market and abattoir at Anderlecht :

ANDERLECHT ABATTOIR AND CATTLE MARKET COMPANY, LIMITED.

Animals sold in the Market.

Year.	Cattle.	Pigs.	Calves.	Sheep.
1895	63,811	50,679	None	None
1896	76,772	63,960	,,	,,
1897	74,861	66,226	28,327	,,
1898	77,228	70,728	32,509	,,
1899	80,886	72,030	42,645	18,339
1900	80,505	80,292	42,256	57,629

Animals killed in the Abattoirs.

Year.	Cattle.	Pigs.	Calves.	Sheep.	Horses.
1895	9,840	26,231	8,015	10,239	495
1896	9,518	28,009	7,309	7,990	493
1897	12,303	28,553	13,606	9,502	869
1898	13,743	32,590	14,416	9,449	757
1899	15,601	47,078	16,969	15,587	700
1900	18,518	57,987	18,856	23,135	784

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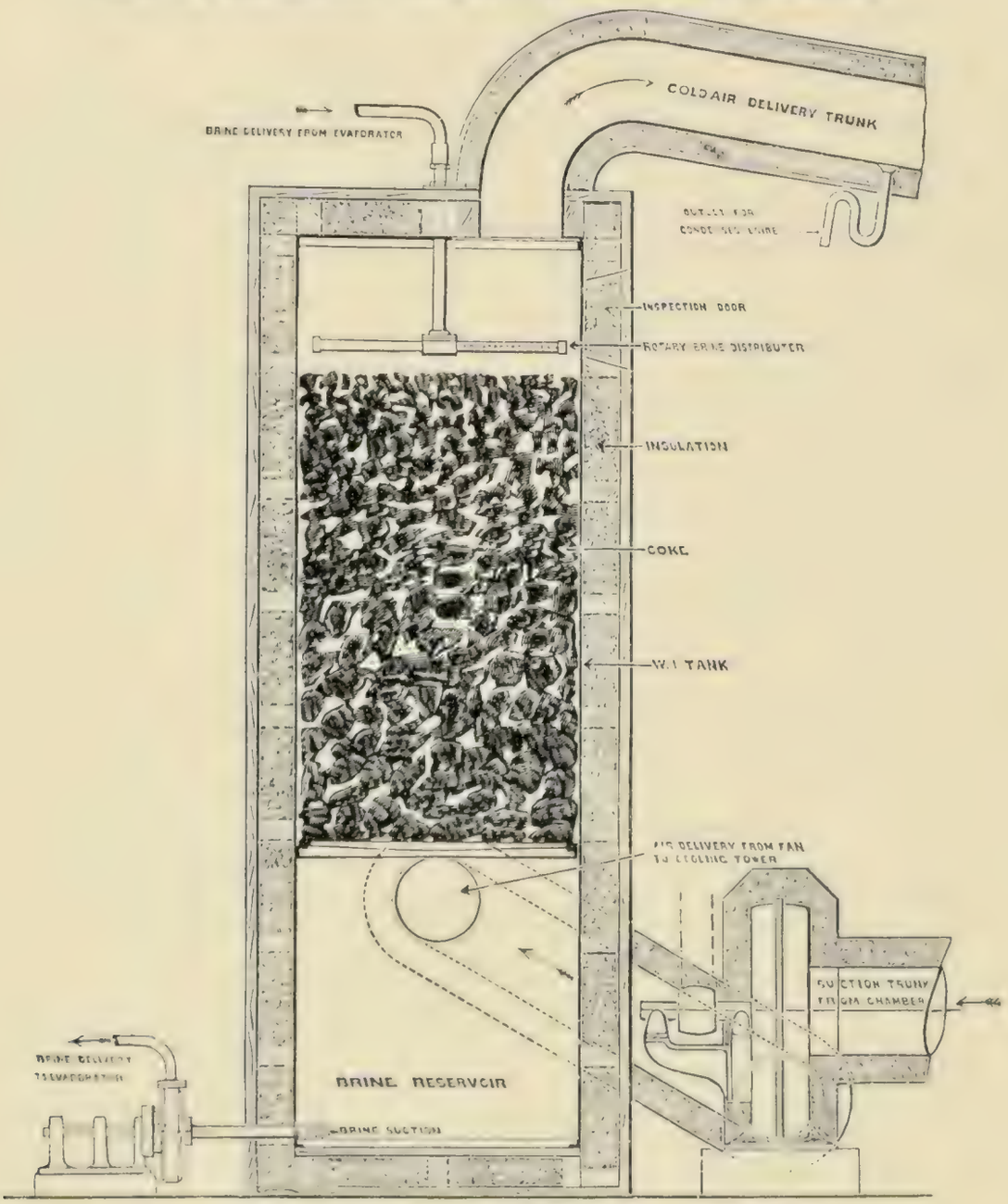

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